THE COMPARATIVE STUDY BETWEEN THE STUDENTS' UNDERSTANDING OF MATHEMATICS BY USING ADOBE FLASH CS3 AND IMINDMAP AT THE TOPIC OF THE LIMIT OF FUNCTION

(Experimental Study at Science Eleventh Class of *SMAN 5 Kota Cirebon*)

A THESIS

Submitted to Mathematics Education Department of Tarbiyah Faculty
In Partial Fulfillment of the Requirements for Scholar Degree In
Mathematics Education (S.Pd.I)

By :

SUDIANTO

Reg. Number : 59451098

MATHEMATICS EDUCATION DEPARTMENT OF TARBIYAH FACULTY
THE STATE INSTITUTE FOR ISLAMIC STUDIES (IAIN)
SYEKH NURJATI CIREBON

2013 M/ 1434 H

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ABSTRACT

Sudianto. 59451098. *The Comparative Study Between the Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Functions (Experimental Study at Science Eleventh Class of SMAN 5 Kota Cirebon).* Thesis. Cirebon : Tarbiyah Faculty, Mathematics Education Department of IAIN Syekh Nurjati Cirebon, July 2013.

The less variation methods or media in mathematics learning became one of the things that can affect the low level of students' understanding of mathematics. Based on information from some the teachers and students, obtained answer that in the process of learning mathematics in *SMAN 5 Kota Cirebon* more incline using conventional method than utilizing media intensively, especially computer-based media. Students are less creative just note down manually which tend to be easily forgotten and only optimize the role of left brain in learning activities.

The aims of the research are (1) To know how is the degree of student's understanding of mathematics by using Adobe Flash CS3 at the topic of the limit of function (2) To know how is the degree of student's understanding of mathematics by using iMindMap at the topic of the limit of function (3) To know the difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap at the topic of the limit of function.

The one alternative of learning media selection that can be used to improve the mathematics understanding is by using Adobe Flash CS3 and iMindMap in learning. The using of learning software these iMindMap and Adobe Flash CS3 are expected to help students and teachers in the process of learning mathematics, especially at the topic of the limit of function by using mind mapping method and flash animation interactive. If we use them properly, certainly the learning activities will be more effective and in accordance with what is to be objectives in education.

The research method used was the experimental method by quantitative approach. The population in this research was all the students of class *XI IPA SMAN 5 Cirebon* that consists of four classes *XI IPA* that was a total of 134 students. While the sample was taken two classes in random, namely class XI IPA 3 as the first experiment class by using Adobe Flash CS3 and class *XI IPA 4* as the second experiment class by using iMindMap in learning activities. The technique of collecting data by using test and observation. The analysis using the prerequisite test which is homogeneity and normality test, and hypothesis testing using independent sample T-test.

Based on the results of hypothesis testing using independent sample t-test is known that $t_{count} > t_{table}$, namely 2.277 > 1.998 then H_o is rejected. This showed that there is significant difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap at the topic of the limit of function

Keywords : Mathematics Understanding, Adobe Flash CS3, iMindMap

THE APPROVAL

THE COMPARATIVE STUDY BETWEEN THE STUDENTS' UNDERSTANDING OF MATHEMATICS BY USING ADOBE FLASH CS3 AND IMINDMAP AT THE TOPIC OF THE LIMIT OF FUNCTION
(Experimental Study at Science Eleventh Class of *SMAN 5 Kota Cirebon*)

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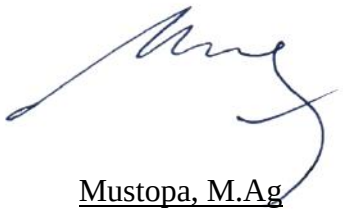	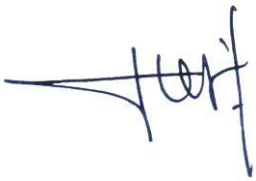
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RATIFICATION

The thesis entitled **"The Comparative Study Between The Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function (Experimental Study at Science Eleventh Class of *SMAN 5 Kota Cirebon*)"** by Sudianto, Register Number 59451098 has been examined in the viva voce held by the Tarbiyah Faculty of the State Institute for Islamic Studies (IAIN) Syekh Nurjati Cirebon on Friday, August 16, 2013. The thesis submitted for fulfill the Partial of Requirement for Islamic Scholar in Mathematics Education.

Cirebon, August 2013

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Assalamu'alaikum Wr. Wb.

After guiding, analyzing, briefing and correcting the writing of Sudianto's thesis with the student's registration number is 59451098 entitled in : "THE COMPARATIVE STUDY BETWEEN THE STUDENTS' UNDERSTANDING OF MATHEMATICS BY USING ADOBE FLASH CS3 AND IMINDMAP AT THE TOPIC OF THE LIMIT OF FUNCTION (Experimental Study at Science Eleventh Class of *SMAN 5 Kota Cirebon*)", we are of the opinion that his thesis can be presented to the Mathematics Education Department of Tarbiyah Faculty of IAIN Syekh Nurjati Cirebon.

Wassalamu'alaikum Wr. Wb.

Cirebon, July 2013

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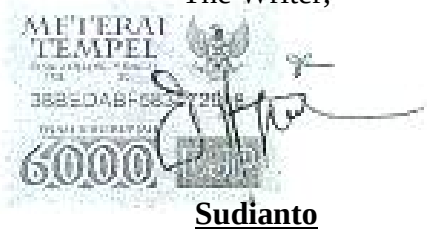
LETTER OF AUTHENTICITY

Bismillahirrahmanirrahim,

I herewith acknowledge that this thesis which is entitled in : "THE COMPARATIVE STUDY BETWEEN THE STUDENTS' UNDERSTANDING OF MATHEMATICS BY USING ADOBE FLASH CS3 AND IMINDMAP AT THE TOPIC OF THE LIMIT OF FUNCTION (Experimental Study at Science Eleventh Class of *SMAN 5 Kota Cirebon*)" is really my own writing with some quotations from some book sources and dictionaries by using the acceptable scientific method of writing.

Honestly speaking, I have written this letter of authenticity according to the truth. I will be sincerely responsible for any risk that will happen in the future if it is proven to offend the ethic of scientific writing.

Cirebon, July 2013
The Writer,



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Dedication

All praise and thankfulness be to Allah because of His permission the writter has finished this thesis on time.

This thesis is dedicated to my parents, who prayed, loved, and gave affection, material to me.

It is also dedicated to my brothers and sister thanks for your supports.

And also to the teachers and lectures, that cannot be mentioned one by one for their motivation, spirit, briefing, guidance and knowledge were given for me

All my best friend, Hasan Rahmat, Mamat, Faishal Fahmy, Eko Kurniawan, Toto Caswanto, Alan Dahlan, Saiful Anwar and the others students of Mathematics-C/ 2009 are never forgotten for 8 semesters, we studied and play together.

Life Motto

"And seek help through patience and prayer, and indeed, it is difficult except for the humbly submissive [to Allah]…"

(*Jadikanlah sabar dan shalat sebagai penolongmu. Dan sesungguhnya yang demikian itu sungguh berat, kecuali bagi orang-orang yang khusyu´...*)

(Q.S. Al Baqarah : 45)

"The best of people are those that bring most benefit
to the rest of mankind"

" If you think it difficult you will find it difficult..

You can if you think you can… "

Inspirational Quotes

“You cannot teach a man anything; you can only help him find it within himself”

“Mathematics is the language with which God has written the universe.”

— Galileo Galilei —

I have not failed. I've just found 10,000 ways that won't work.
Many of life's failures are people who did not realize how close they were to success when they gave up.

— Thomas A. Edison —

“ I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me”.

— Isaac Newton—

” A person who never made a mistake never tried anything new”.

The true sign of intelligence is not knowledge but imagination. "Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world

— Albert Einstein —

"Your work is going to fill a large part of your life, and the only way to be truly satisfied is to do what you believe is great work. And the only way to do great work is to love what you do. If you haven’t found it yet, keep looking.
Don’t settle.."

— Steve Jobs —

“Cogito ergo sum. *(I think, therefore I am.)*”
— René Descartes —

PREFACE

In the name of Allah, Most Gracious, Most Merciful. All praises and thankfulness be to Allah because of His permission the writter has been able to finish this thesis. May invocation and safety always be given to the Prophet Muhammad (Peace Be Upon Him), His family, colleagues, and followers up to the end of the word.

This thesis is entitled in : **THE COMPARATIVE STUDY BETWEEN THE STUDENTS' UNDERSTANDING OF MATHEMATICS BY USING ADOBE FLASH CS3 AND IMINDMAP AT THE TOPIC OF THE LIMIT OF FUNCTION (Experimental Study at Science Eleventh Class of *SMAN 5 Kota Cirebon*).** It is presented to the Mathematics Education Department of IAIN Syekh Nurjati Cirebon in partial fulfillment of requirements for Islamic Scholar in Mathematic Education.

In writing this thesis, there are so many people who have participated, supported, helped, and advised. So in this oppurtinity the writer would like to convey her sincere gratitude to :

1. Prof. Dr. H. Maksum, M.A., Chairman of IAIN Syekh Nurjati Cirebon.
2. Dr. Saefudin Zuhri, M.Ag., Dean of Faculty Tarbiyah
3. Toheri, S.Si, M.Pd., Chairman of Mathematics Education Department
4. Mustopa., M.Ag., the first supervisor
5. Arif Muchyidin, M.Si., the second supervisor
6. All lectures of IAIN Syekh Nurjati Cirebon that cannot be mentioned one by one for their motivation.
7. Drs. Mulya Hadiwijaya, M.Pd., Headmaster of *SMA Negeri 5 Kota Cirebon*
8. Yanto Sugianto, M.Pd., Mathematics Teacher of *SMA Negeri 5 Kota Cirebon*

The writer reliazed that this thesis is still far for being perfect and of course there are many mistakes both in the content and in the arrangement of this thesis. Therefore, any comment and suggestion given by readers would be gladly welcome.

Hopefully, this thesis will be usefull for the readers especially, for the writer and also for the students of State Instute for Islamic Studies (IAIN) Syekh Nurjati Cirebon.

Cirebon, June 2013

The Writer,

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CHAPTER 1
INTRODUCTION

A. The Background of The Problems

The development of science and technology has taken change almost all the human's aspects of life where the problems only can be solved except by efforts of mastery and improvement of science and technology. To be able to participate in the global competition, then we need to develop and improve its human's resources quality. Education is very important and primary for every nation and country to create and prepare human's resources quality be a reliable, good quality for the sake of successful development.

According to Indri Hardini et al. (2009 : 4), the general problem of education in Indonesia is low quality of the education result that is caused because of the poor quality of the learning process. The low quality of learning which is caused by the method or learning model applied by the teachers in explaning materials to learners and less the teachers' understanding in modified learning so that learners are not active and not creative in learning.

Mathematics has a very important role in the mastery of science and technology, because mathematics is a science that can not be separated from the other knowledge or in daily life. But often mathematics learning is seen as a learning is limited at school and not touch daily life. Students just memorize mathematics concepts without seeing directly problem. In fact mathematics is a science that is very useful in solving the problems of life. Because

mathematics is a basic component of the development of science and technology.

Based on the preliminary studies that the researcher observed through the observation of some the education institutions in high school's level, obtained an overview that generally learning method is used mathematics teachers are still using lecture method. So with mathematics learning in *SMAN 5 Kota Cirebon.* Based on information from some the teachers, obtained answer that in the process of teaching mathematics in *SMAN 5 Kota Cirebon* more incline using conventional method than utilizing media intensively, especially computer-based media.

Based on information from one of the students of *SMAN 5 Kota Cirebon* also said most students learn manually by note and doing exercises that incline to be easily forgotten and in learning, teachers use only lecture method. The using of lecture method in modern era such as today it is clearly inappropriate. By using the lectures method in learning activities impressed monotonous and less variation in learning, so that when teaching and learning go on a long time, the students' focus and attention are reduced due to feel saturated, so the subject material is less well delivered. This is the reason why some people are less motivated to learn mathematics and incline only to optimize left brain function in the lesson.

Through the using of learning software these iMindMap and Adobe Flash CS3 are expected to help students and teachers in the process of learning

mathematics, especially at the topic of the limit of function by using mind mapping method and flash animation interactive. In Order to learning can take place optimally, learning activities should optimize ability of the left and right brain. Mind map is a technique notes that optimaze ability of the left and right brain because mind map imitates the way of headwork stores information. By using a mind map is the topic very much can be mapped in only one sheet of paper or a page that contains the important points in the sub materials. So by using a mind map facilitates the students and teachers to understand the whole materials that will be studied and students are also able to think radially (comprehensive). With the flash animation also facilitates teachers to deliver the material. With a blend of images, animations, sound, text and graphics, are also expected to be more interactive learning and fun, so that the learning objectives can be well achieved.

Based on the description above, the researcher is interested in doing research using Adobe Flash CS3 and iMindMap in learning. Thus the title of the research is chosen is "The Comparative Study Between The Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function (Experimental Study at Science Eleventh Class of *SMAN 5 Kota Cirebon*)."

B. The Formulation of The Problems

1. The Identification of the Problems

Based on the description of the background of the problem above, the researcher tries to identify some of the problems which relate in this research are:

a. The development of technology has changed rapidly, but the lack of utilization of computer media in teaching and learning activities.
b. The use of media or method in learning less varied that are only limited to the conventional methods such as lecture method.
c. The lack of creativity in learning mathematics, students only note down manually which tend to be easily forgotten and only optimize the role of left brain in learning activities.
d. Need to improve the students' understanding of mathematics in solving mathematics problems.
e. Teaching and learning activities are still focused on the teacher as a subject not as a facilitator, so ignore the role of students in learning.
f. The lack of students' interest, curiosity and motivation in learning mathematics.

2. The Limitation of The Problems

Researcher limits the scope of the problems will be discussed as follow:

a. The result of design learning media that is created by using Adobe Flash CS3 as a learning media.

b. The using of iMindMap as learning media is aimed to the students as the technique notes by using mind mapping method and to the teachers to deliver teaching materials.

c. The Students' understanding of mathematics which measure the degree of understanding and material mastery in the cognitive domain obtained from the test results.

3. The Questions of The Research

Based on the problems above, the researcher formulates the questions of the research as follow:

a. How is the degree of students' understanding of mathematics by using Adobe Flash CS3 at the topic of the limit of function?

b. How is the degree of students' understanding of mathematics by using iMindMap at the topic of the limit of function?

c. Is there any difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap at the topic of the limit of function?

C. The Aims of The Research

The aims of the research are as follow :

1. To know how is the degree of student's understanding of mathematics by using Adobe Flash CS3 at the topic of the limit of function.
2. To know how is the degree of student's understanding of mathematics by using iMindMap at the topic of the limit of function.

3. To know the difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap at the topic of the limit of function.

D. The Uses of The Research

1. Theoretical

   Theoretically, these research findings are expected to contribute to the depth of knowleadge in developing the mathematics.

2. Practical

   a. Can be used by the mathematics teachers as learning media selection to organize the teaching and learning activities are effective and efficient.

   b. To provide an overall picture of the problems clearly and detailed on a specific topic by using Adobe Flash CS3 and iMindMap.

   c. As an attempt to improve the students' understanding of mathematics

CHAPTER II
THE THEORETICAL FOUNDATIONS

A. Theoretical Description

1. Concept of Learning

Learning is something that we often hear. In general, learning can be defined as the process of change in behavior as a result of individual interactions with the environment. Behavior contains a broadly meaning covers the knowledge, understanding, skills, attitudes, thinking ability, an appreciation for something, interests and so on (Sumiati and Asra, 2011: 38). Learning is an obligation for every people who have common sense, because people basically have the curiosity and the wish to be better.

Learning is an interaction process of all the situations that exist around the individual. Learning can be viewed as a process directed to the purpose and process of doing through various experiences. Learning is a continuous process that goes on from birth until death, in learning occurs the changes in behavior that is relatively permanent, the results of the study is shown by behavior, in learning there are aspects that a role are motivation, emotional, attitude, and others.

Among the definitions of learning according to experts are as follows:

a. Cronbach (Bahri Djamarah, 2008: 13) argued that learning is shown by change in behavior as a result of experience.

b. Skinner also defined learning is as a process of adaptation or adjustment in behavior that goes a long time (Fathurrahman and Sobry Sutikno, 2010: 5)

c. Slameto also formulated the definition of learning is a process of effort that is done individual to obtain the new behavior changed as a whole, as a result of own individual's experience in the interaction with the environment (Bahri Djamarah 2008: 13)

From some the definitions above, we can conclude that learning essentially is a "change" happening in a person after doing a certain activity. Although in reality, not all the changes are included the learning categories. For example, physical changes, drunk, crazy and so on. In learning the important thing is the process, not the results obtained. It means that learning must be obtained by own efforts, while other people just as an intermediary or supporting in the learning activities, so that learning can be successful well. When children get a good test result it can not be said to be learning when the test results obtained by improper means such as cheating.

Finally, it can be concluded that learning is a series of events or activities to obtain a change in behavior as a result of the individuals experience in interaction with its environment is related aspects of cognitive, affective and psychomotor.

2. Learning Media

The word “media” is derived from Latin the plural of the word “medium” which literally means an intermediary or introduction. Media is intermediary or introductory message from the sender to the receiver of message (Susliana & Cepi Riyana, 2007: 5). According to AECT as quoted by Asnawir & Basyiruddin (2002: 11) defined media is all forms that are used for the process of information channeling.

Gearlach & Ely said that if the media is understood broadly is human, material, or events that establish conditions that make the students enable to acquire knowledge, skills or attitudes (Azhar Arsyad, 2003: 3). In this meaning, teachers, textbooks, and school environment are the media. More specifically, the definition of media in teaching and learning activities tend to be interpreted is as graphical tools, photographic, or electronically to capture, process, and rearrange visual or verbal information in learning activities, media can be defined as something that can bring information and knowledge in interaction that goes on between educators and learners.

Based on the meaning mentioned above, then the learning media is everything that is used in the learning activities in order to stimulate the mind, feelings, interests and students’ concerns so that the interaction process of communication education between teacher (or media makers) and students can take the appropriate and empowering. The using of media creatively will allow the audience (students) to learn better and can

improve the students' ability to learn so that the learning objectives can be achieved.

3. Multimedia of Learning

According to Vaughan (Binanto, 2010 : 2), multimedia is a combination of text, art, sounds, pictures, animations, and videos presented by computer or manipulated digitally and can be delivered and or controlled interactively. Multimedia in the context of a computer is the computer utilization to create and combine text, graphics, audio, video, using a tool that allows users to interact, create and communicate.

According Ariani and Dani (2010 : 25), multimedia is divided into two categories, namely:

a. Linear multimedia is a multimedia that is not equipped with any device controller that can be operated by the user. Multimedia is running a sequential (sequence) such as TV and film.
b. Interactive Multimedia is multimedia that is equipped with any device controller that can be operated by the user. So that the users can choose what you want for the next process. Examples for multimedia interactive is a multimedia interactive learning, application, games, etc.

The multimedia utilization is very much, all of them are learning media, gaming, movies, world medical, military, business, design, architecture, sports, hobby, advertising/promotions and other.

As for some of the benefits that can be taken in multimedia learning, namely:

a. To enlarge very small objects and not visible by eyes like, germs, bacteria, and so on.
b. To minimize the very large objects that may not be presented to the school, such as elephants, houses, mountains, and others.
c. To present the objects or events are complex, complicated, and takes place sooner or later as the human's body system, work of a machine, the orbit of a planet, growing flowers and much more.
d. To present the objects or events far away as the moon, the stars, the snow, and others.
e. To present a dangerous objects or events, such as volcanic eruptions, tigers, poison, and others.
f. To increase the attractiveness and students' concern.
Ariani and Dani (2010 : 26)

If the multimedia of learning is selected, developed and used appropriately and well, it will give enormous benefits for the teachers and students. In general, the benefits that can be obtained is the learning process more interesting, more interactive, the amount of time teaching can be reduced, the students' learning quality can be enhanced and the practice of teaching and learning can be done anywhere and anytime.

4. The Using Media of Computer

Computer-based learning media is one of the very atractive learning media and able to increase the motivation of learning to the learners. The use of the computer as a media of interactive learning can be manifested in many forms, including Computer-Assisted Learning (CAL), computer conferences, electronic mail (e-mail) and the computer multimedia be utilized in interactive learning (Warsita, 2008: 137).

Computer-assisted learning program is utilized entire the computer capabilities that consist of a combination of almost all media, namely: text, graphics, images, photographs, audio, and video, animation.

According to Rahman et al. (2008 : 2) the use of computers in learning at the school, it can be classified into several types, namely:

a. Exercise program (drill and practice), which is a program designed to use learners in doing exercises.
b. Tutorial program, the program is designed so that the computer can act as a tutor in the learning process.
c. Demonstration program, a program that is used to visualize abstract concepts.
d. Simulation program, a program that is used to visualize the dynamic process.
e. Instructional game program, a program that is used for games by using computer instructions with the aim to improve the material understanding taught.

As for according to M. Kafit (2009 : 95) the advantage of learning uses computer media, among others:

a. Computer-assisted learning when well designed, is an effective learning media, it can facilitate and improve the quality of learning
b. To increase the students' learning motivation
c. To support individual learning as the students' ability
d. It can be used as a transmitter of direct feedback
e. Material can be repeated as necessary, without causing a sense of saturation.

While the limitations of learning uses computers media are:

a. Limitations of dialog or form of communication
b. Frequent using the computer can cause dependence as result of deficient
c. To reduce an attitude of social interaction that should be an important part in education.
(M. Kafit, 2009 : 96).

5. Mathematics Understanding

a. Definition of Mathematics Understanding

Understanding means a process, action, how to understand truly or to study well in order to understand. Understanding is defined as the absorption of a material studied. According to Bloom comprehension is the ability to grasp the meaning and the sense of the materials studied. Comprehension is the ability to understand the meaning of a learning materials, such as: to interpret, explain, or summarize something, this ability is higher than knowledge (Setiawan et al., 2010 : 7).

According Skemp (Nugraha Sumarna, 2013 : 2) mathematics understanding is the ability to connect mathematical notation and symbolism with relevant mathematical ideas and to combine these ideas into chains of logical reasoning. Mathematics understanding is one of important part in the process of learning mathematics. Comprehension gives the sense that the material taught to students not only as memorizing, but more than that, with comprehension students can better understand the concept of the subject matter itself. Mathematics understanding is an important foundation for thinking in solving mathematics problems and in daily life problems. Mathematics understanding is also one of the goals of any material delivered by the teacher, because the teacher is supervising the students to achieve the expected concept. This is in accordance with

Hudoyo (Dohrul Muhrom, 2013 : 3) which states: "the purpose of teaching is so that knowledge that is delivered can be understood the learners ". Good education is a successful effort to bring students to the objectives to be achieved is so that the material delivered fully understood by the students.

Sudjana (2004: 24) stated that comprehension is distinguished into three categories, as follows:

a) the first degree or the lowest degree, is the comprehension of translation, starting from translation in the true sense as translating the words or symbols;
b) the second degree is the comprehension of interpretation, namely connected the previous sections with the next knowleadge, or connected several parts of the graph with the incident, for example, to find out the volume of a cylinder must be considered first the area of its bottom is the area of a circle.
c) the third degree or highest degree, namely the comprehension of extrapolation. With extrapolation is expected able to see behind the writing (give meaning), can make predictions about the consequences or can expand the perception in the sense of time, dimension, case, or problem.

Michener stated that comprehension is one aspect of Bloom's Taxonomy. Comprehension is defined as the meaning absorption of a material studied. To understand an object depthly someone should know: 1) object itself; 2) relation with other objects are similar; 3) relation with other objects are not similar; 4) relation-dual with other objects are similar; 5) relation with objects in other the theory. (Sumarmo, 1987 : 24)

Based on the description above about the definition of mathematics understanding, it can be concluded that the mathematics understanding is the ability to grasp the meaning and sense of the materials studied, namely is about mathematics and able to re-explain the material that was delivered and able to answer the questions are submitted in the form of test.

b. The Kinds of Mathematics Understanding

Understanding belongs to the cognitive domain that contains behaviors emphasize the intellectual aspects, such as knowledge, meaning, and thinking skills. There are several kinds of comprehension according to the experts, namely:

Polya (Rahmawati, 2013 : 2), distinguished four kinds of comprehension are:

1) Mechanical comprehension, which can remember and apply something routinely or simple calculations.
2) Inductive comprehension, which can try something in the simple case and know that something is true in similar cases.
3) Rational comprehension, which can prove the truth of something.
4) Intuitive comprehension, which can predict something true without any doubt, before analyzing analytically.

Polattsek (Rahmawati, 2013 : 2), distinguished two kinds of comprehension, namely:

1) Computational comprehension, which can implement something in the calculation routine/simple, or do something in algorithmic.
2) Functional comprehension, which can be connected to something else correctly and realize the process is done.

Copeland (Rahmawati, 2013 : 2), distinguished two kinds of comprehension, namely:

1) *Knowing how to*, which can do something routinely/ algorithmic.
2) *Knowing*, which can do something with conscious from the process of doing.

Skemp (Rahmawati, 2013 : 2), distinguished two kinds of comprehension, namely:

1) Instrumental comprehension, something that is memorized separately or can apply something to the calculation routine/simple, doing something in algorithmic
2) Relational comprehension, which can be connected to something else correctly and realize the process is done.

As for the kind of comprehension that will be examined in this research is computational and functional comprehension. Computational comprehension is the ability to apply the formula in the simple calculation and doing on the calculations in algorithm. While the functional comprehension is the ability to associate a concept to other principles and realized the process is doing.

6. Adobe Flash CS3

Adobe Flash CS3 is animation software released Macromedia that has been adopted by Adobe, inc now. It is used to manage graphics and vector-based animation with action script 2.0 programming language that has been able to enliven programming based on the Object Oriented Programming (Darjat, 2009 : 5). The file is generated of this software has

.swf file extension and can be played in a web browser that has been installed Adobe Flash Player. Flash is very popular among graphics and multimedia, in addition, this application also can be used to create animated logos, movie, games, interactive learning CD for education, making navigation on the website, animated buttons, banners, interactive menus, interactive form filling, e-cards, screen savers and making other web applications. In Flash, there are techniques to make animation, action script facility, filters, custom easing, and can enter a full video with FLV playback facilities (http://id.wikipedia.org/wiki/ Adobe_Flash, accessed on June 24, 2013 at 01.15 pm)

The following is an explanation of the appearance of Adobe Flash CS3 and tools are often used:

Figure 2.1 The Display Creates a New File

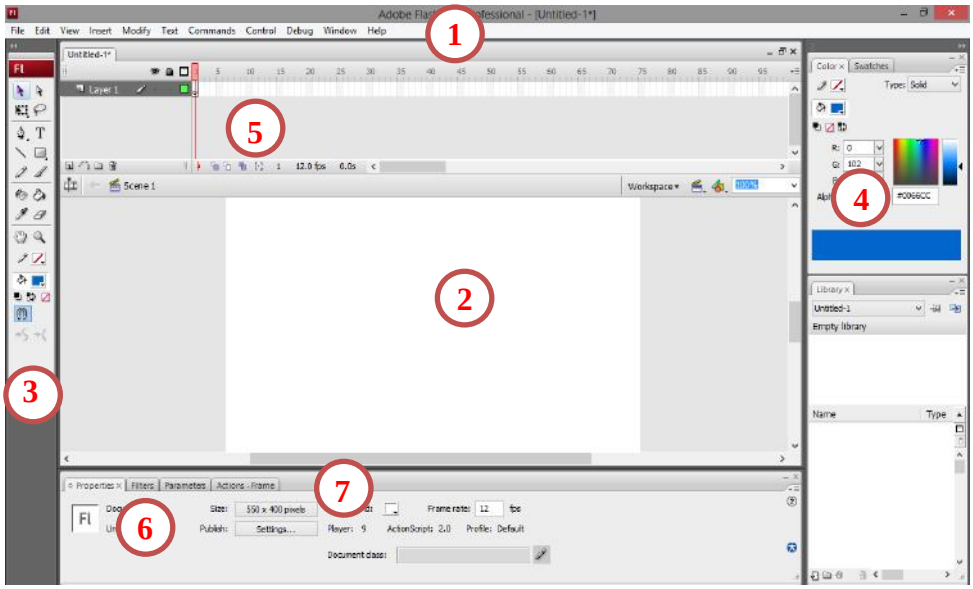

Figure 2.2 The Display of Adobe Flash CS3

Description :

1) Toolbar Menu

Toolbar menu contains commands operations in Adobe Flash CS3 such as: *file*, *edit*, *view*, *insert*, *modify*, *text*, *commands*, *control*, *debug*, *windows* and *help*. Through the toolbar menu you can show or remove editorial tools, property, arrange interface, input external file and various display on the interface, modify objects, control the movie and others.

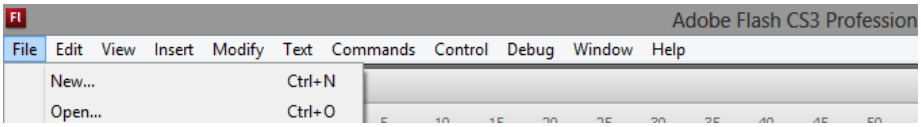

Figure 2.3 The Display of Toolbar Menu

2) Stage

Stage, workpage used to put various objects flash displayed.

Figure 2.4 The Display of New Stage

3) Toolbox,

Toolbox, a collection of tools or equipment that has its own functions for various purposes such as design, editing, and setting the image or object.

Table 2.1
Names and Functions of the Toolbox

Icon	Name of icon	Description
	*Selection Tool (V)*	To select objects on stage or buttons.
	*Subselection Tool (A)*	To select objects on the stage and change the shape, size of the object.
	*Free Transform Tool (Q)*	To modify the size and arrange the rotation of the object.
	*Gradient Transform Tool (F)*	To adjust color gradation on the object.

	*Lasso Tool (L)*	To select objects.
	*Text Tool (T)*	To create a text object.
	*Line Tool (N)*	To create straight lines object
	*Rectangle Tool (R)*	To create a square / rectangular shaped objects.
	*Oval Tool (O)*	To create a circle shaped object
	*Rectangle Primitive Tool (R)*	To create a square / rectangular shaped objects. And can arrange the curvature at each corner directly
	*Oval Primitive Tool (O)*	To create a circle shaped object. And can arrange a circle shaped directly. For example, half circle, ¾ circle, ¼ circle, etc.
	*PolyStar Tool*	To create a polygon shaped object and stars.
	*Pencil Tool (Y)*	To create a free line shaped objects.
	*Brush Tool (B)*	To draw a free form.
	*Ink Bottle Tool (S)*	To give color and lines on an object.
	*Paint Bucket Tool (K)*	To give color at plane object
	*Eyedopper Tool (I)*	To determine color by seeking the color sample from a particular object.
	*Eraser Tool (E)*	To erase an image object.
	*Hand Tool (H)*	To arrange the stage position.

	Zoom Tool (M)	To view the entire stage on the screen, or to view a particular area
	Stroke Color	To determine the color of the line on the object.
	Fill Color	To determine the basic color / color on objects
	Pen tool (P)	To create a line objects interconnected
	Add Achor Point Tool (=)	To add connection point in every line object.
	Delete Anchor Point Tool (-)	To reduce / remove connection point in every line object
	Convert Achor Point Tool (C)	To arrange the rotation of the curvature of a line.

4) Color Mixer panel

Panel has function for adjusting the color of an image or object.

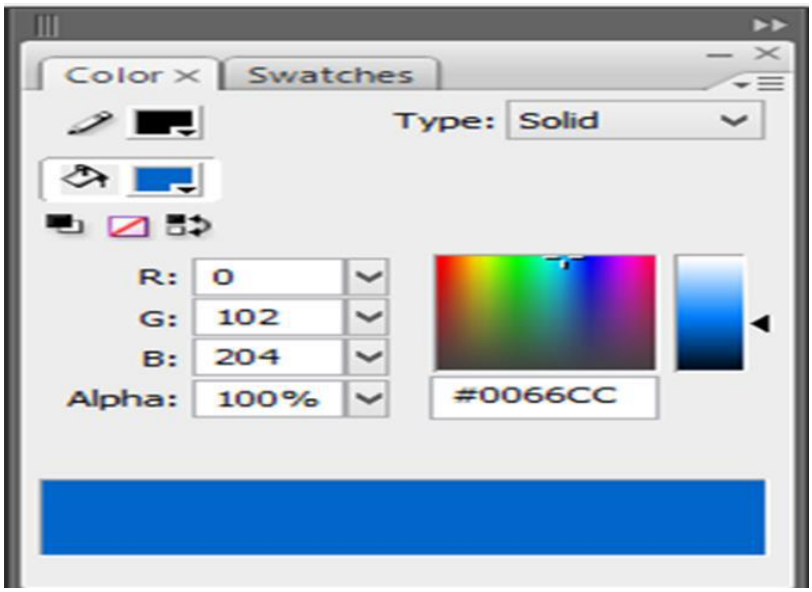

Figure 2.5 The Display of Color Mixer Panel

5) Layer dan Timeline

- *Layer* can be analogized as a painting canvas. The number of layers can be more than one, in other words, multi-layered. The topmost layer is the layer located at the front.
- *Timeline* has function to assist the placement of objects on the time function.

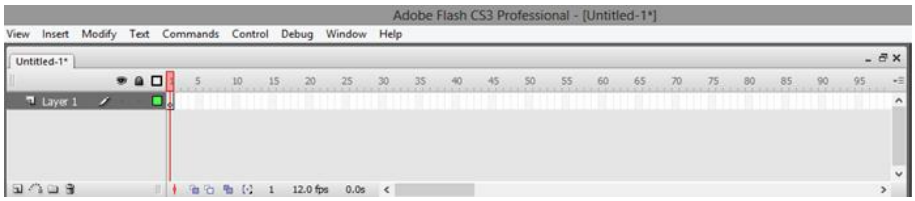

Figure 2.6 The Display of Layer and Timeline

6) Properties

Properties is a panel that displays information related to the currently active object such as images, text, stage and so on.

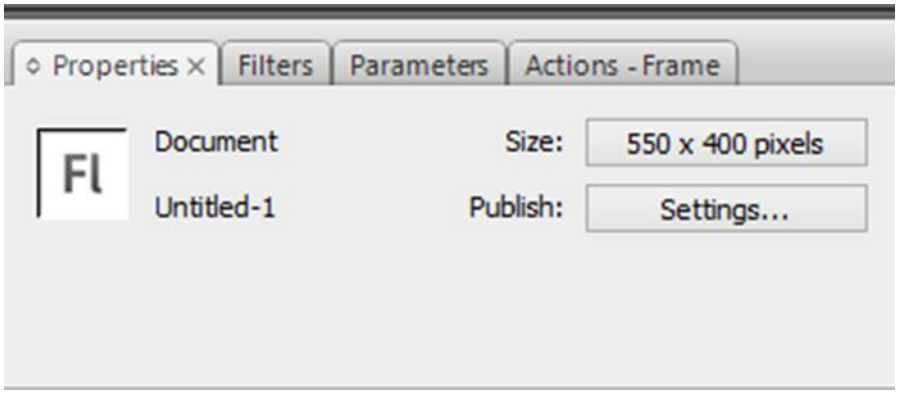

Figure 2.7 The Display of Properties

7) Action script

Action script is a programming language in a flash. Adobe Flash CS3 supports all versions action script start from 1, 2, up to the latest version of action script 3.0.

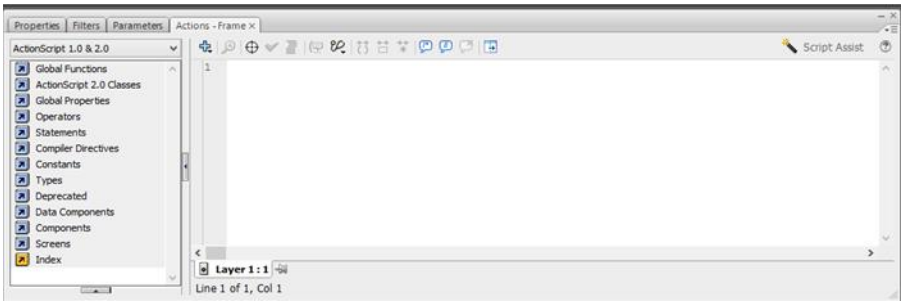

Figure 2.8 The Display of Action Script

(Hidayatullah et al., 2011 : 23-26)

7. The Using Adobe Flash CS3 as Learning Media

Adobe Flash CS3 is a combination of the learning concept with audio-visual technology that can produce new features that can be utilized in education. Multimedia-based learning can present subject matter is more interesting, not monotonous, and ease delivery. Students can study a particular subject matter independently with computers equipped with multimedia programs. The using Adobe Flash CS3 as learning media is a design results of media that will be used in the teaching and learning process. This application has the file extension. swf or .exe that can be run on Windows or other operating systems.

The following is the advantages using of Adobe Flash CS3 in the learning:

a. It is the most popular animation technology that is used in a variety of things including making an interactive learning CD.
b. It can be designed in such a way, as attractive as possible by using a programming language or action script, unlike other programs that static is limited to the existing menu.
c. The result of the application that made to have a small file size with good quality.
d. Learning uses the flash it can be repeated until understand without get bored, it is different with human nature that has saturated.
e. With the animation and image can enhance students' understanding.
f. In teaching, the teacher just give particular emphasis to the material, so the time is needed to teach can be reduced and the knowledge obtained it can be better.

As for the deficiencies of Adobe Flash CS3 in the learning are:

a. It takes a long time to design or create learning media using Adobe Flash.
b. There is programming language or *action script* that is for most people difficult to learn it.
c. Not everyone is able to make it, because it must have more ability in computer.
d. It is not a freeware
e. To require no small cost, there should be a support infrastructure such as labs, projectors, laptops, etc.

8. iMindMap Software

iMindMap is a concept mapping software that uses Tony Buzan's brand of Mind Mapping methods to create maps for brainstorming, organizing, creative thinking, project management, planning and delivering presentations.. This application is developed by ThinkBuzan Ltd. Buzan's iMindMap can be used with operating system such as Microsoft Windows, Macintosh, Mac OS X and Linux. This software allows for the creation of mind map using hardware in the computer such as mouse, keyboard, tablet computer or interactive white board. (http://en.wikipedia.org/wiki/Buzan%27s_iMindMap, accessed on August 18, 2013 at 11.07 pm).

Tony Buzan is a reliable and well-known figure in the intelligence and creativity. He is inventor of the mind map method in the late 1970s who developed the idea to establish the ThinkBuzan company and president of ThinkBuzan Ltd. Then he made and developed an application based on a map mapping known as iMindMap software. iMindMap was first release in 2006 and the version was released to experience development and changed. Tony had taught throughout the world and the audiences consist of a variety of them, both members of the company, activist and universities academic to government agencies. (http://id.wikipedia.org/wiki/IMindMap, accessed on June 23, 2013 at 07.10 pm)

Mind Map uses the brain appropriate the ways of natural working and thinking unique, so it is able to enhance creativity and manage information better. It makes "thinking" becoming visual. Different assumption has been there that thinking is something abstract. Mind mapping is a way to put information into the brain and take it back to the outside of the brain. Form of mind mapping is like a road map in a city has many branches. Just as the road map we can make the overall view of the matter in a very wide area (Tony Buzan, 2010: 4). With a map we could plan a fastest route, proper and find out where we are going and where we are. Mind Map can understand the whole materials that will be studied and students are also able to think radially.

Among the home screen of iMindMap software is as follows:

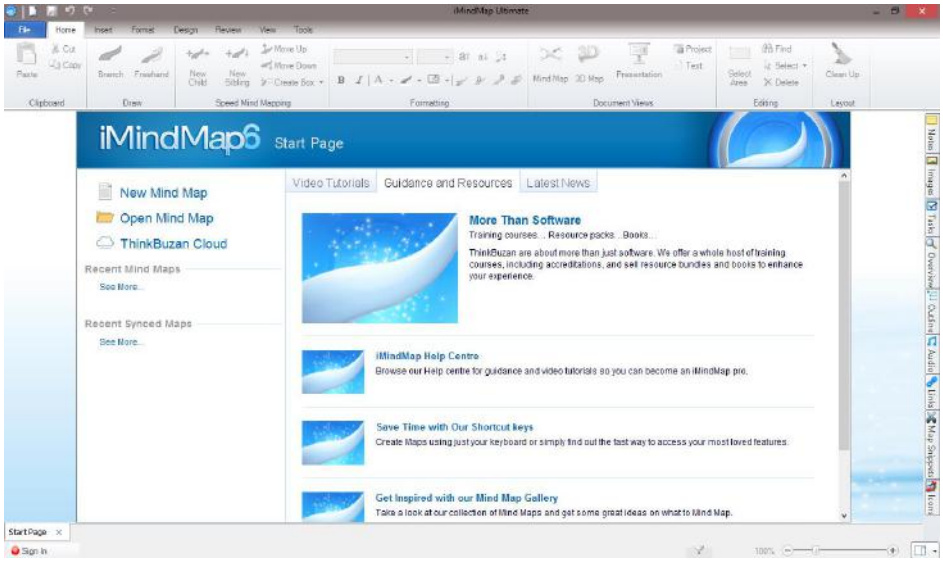

Figure 2.9 The Display of iMindMap

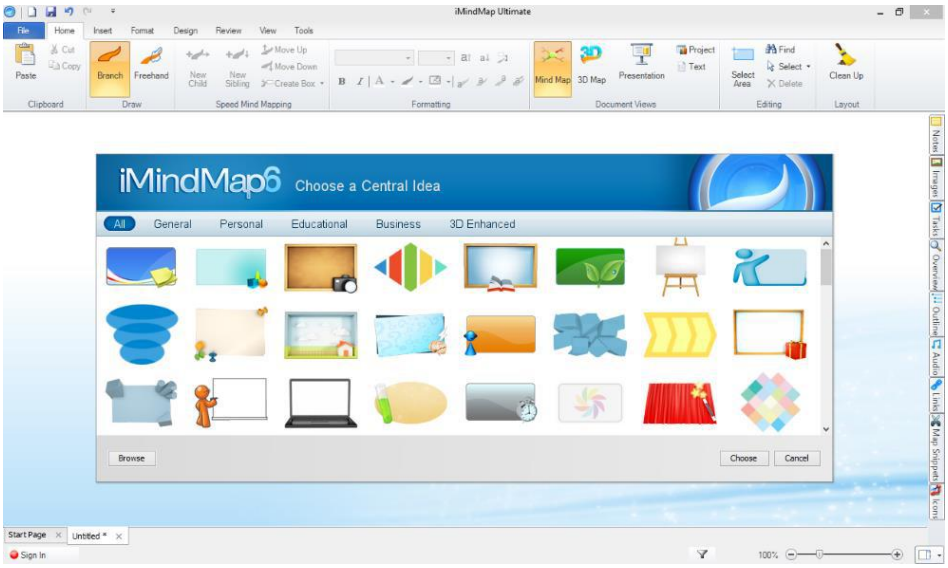

Figure 2.10 The Display of Option Main Idea

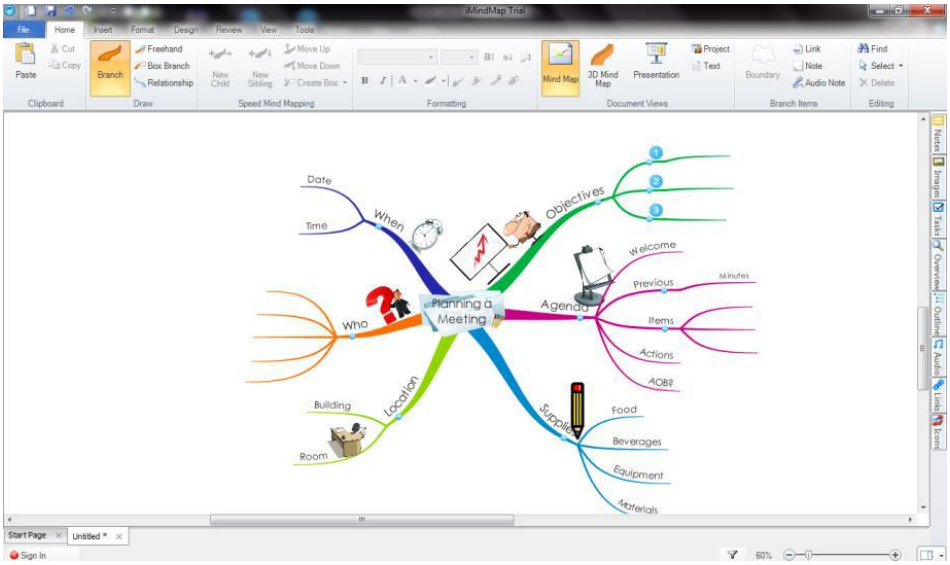

Figure 2.11 The Display of Using iMindMap

9. The Using iMindMap as Learning Media

iMindMap is a program that is used to create mind mapping digitally with the help of computers. The results of the mind map is used as the selection of learning media that is aimed to the teacher in delivering teaching materials and to the students as technical notes using mind mapping method. In the mind map program, there are some tools that can be used to facilitate the use of mind maps in learning. With iMindMap we can present the subject matter through *presentation* tool that can display material from *branch by branch* or directly *by main branch*. In addition, there are features in the form of 3D presentation, so that teaching material is more interactive and interesting.

The following is a display presentation using iMindMap software:

Figure 2.12 The Display of Slideshow in 3D

Mind map has been widely used in education in many developed countries in the world, such as England, Scotland, Mexico, Lichtenstein, Singapore and others. For the learners and students, mind map also helps children learn more easily, fast, and fun. Mind maps can also ensure the children to solve the children and parents' classical problem, namely the lesson is too much. By using a mind map, children can learn less, but get more information. Children also become free of stress, understand and remember better. (http://www.brainicsmart.com/buzan-mind-map.html, accessed on August 19, 2013 at 10.45 pm)

Mind map has the advantages that can be used in teaching and learning are:

a. To provide a holistic view of the subject matter / materials to be studied.
b. To allow us to focus on the subject
c. To help show the relationship between the separate parts of information.
d. It is fun to watch, read, digested, and remembered, because it involves the role of the right brain such as, coloring, artistic, creativity, imagination and so on.
e. The study materials are too many and very solid can be easily organized to reduce the physical volume of notes because the mind map contains only the key words.

As for the deficiencies in using mind map are as follows:

a. Mind mapping tends only suitable for the people with visual learning styles, because this technique requires code conversion between material in the form of symbols and images. Sometimes people with different learning styles, not until the completion of his work on doing mind mapping, because it is less suitable.
b. To require no small cost in using this learning software, due to must be a support infrastructure such as computers and projector that is not all schools there.
c. Software iMindMap is still many people know yet, so its using should be a lot of explaining about its utility function and how to apply it.

10. Steps to Making a Mind Map

Mind mapping is a visual form of note taking that offers an overview of a topic and its complex information, allowing students to comprehend, create new ideas and build connections. There are some needed to create Mind Map such as blank unlined paper, coloured pens and pencils, brain, imagination. In Mind Map, there are no limits to the number of thoughts, ideas and connections that our brain can make.

As for according Buzan (2005 : 15), there are 7 steps to create Mind Map as follow :

a. Start in the CENTRE of a blank page turned sideways. Why? Because starting in the centre gives your Brain

freedom to spread out in all directions and to express itself more freely and naturally.

b. Use an IMAGE or PICTURE for your central idea. Why? Because an image is worth a thousand words and helps you use your Imagination. A central image is more interesting, keeps you focussed, helps you concentrate, and gives your Brain more of a buzz.
c. Use COLOURS throughout. Why? Because colours are as exciting to your Brain as are images. Colour adds extra vibrancy and life to your Mind Map, adds tremendous energy to your Creative Thinking, and is fun.
d. CONNECT your MAIN BRANCHES to the central image and connect your second- and third-level branches to the first and second levels, etc. Why? Because your Brain works by *association.* It likes to link two (or three, or four) things together. If you connect the branches, you will understand and remember a lot more easily.
e. Make your branches CURVED rather than straight-lined. Why? Because having nothing but straight lines is *boring* to your Brain.
f. Use ONE KEY WORD PER LINE. Why? Because single key words give your Mind Map more power and flexibility.
g. Use IMAGES throughout. Why? Because each image, like the central image, is also worth a thousand words. So if you have only 10 images in your Mind Map, it's already the equal of 10,000 words of notes.

Mind mapping is a beneficial learning tool to help students brainstorm any topic and think creatively. Mind maps are particularly helpful in the writing process and provide students with a natural way of thinking and building thoughts on a story plot or theme. Mind maps also provide teachers with insight into their students' thought process regarding a specific topic. By asking students to create mind maps demonstrating their comprehension of a concept, teachers are able to understand what a student's prior knowledge was and how well the student understands the assignment or the material being taught. This is a very effective way of evaluating students' understanding.

(http://www.inspiration.com/visual-learning/mind-mapping, accessed on August 21, 2013 at 11.35 pm)

B. The Frame of Thinking

Computer is a multimedia that can be utilized in many ways, one of them is as a learning media. If we use it properly, certainly the learning activities will be more effective and in accordance with what is to be objectives in education. Learning media is a way used by teachers in planning a learning. Selection of appropriate learning media will allow students to learn well and accordance with the objectives to be achieved.

The use of learning media Adobe Flash CS3 has many advantages such as learning can be repeated without causing saturation and allows students to learn independently. The learning activities using Adobe Flash CS3 also can be designed in accordance with the purpose and content of the learning materials to be delivered, so students can learn more actively, but it needs long time to design learning media using Adobe Flash CS3. As for the learning process by using iMindMap, students can find out the overall overview of the material to be studied, and students can also focus on a particular subject, but iMindMap tends only suitable for the people with visual learning styles. So If we utilize the use of learning media effectively, sure the learning activities can be run well and can increase students' understanding, because media has big influence in enhancing the success of learning.

The frame of thinking in this research is:

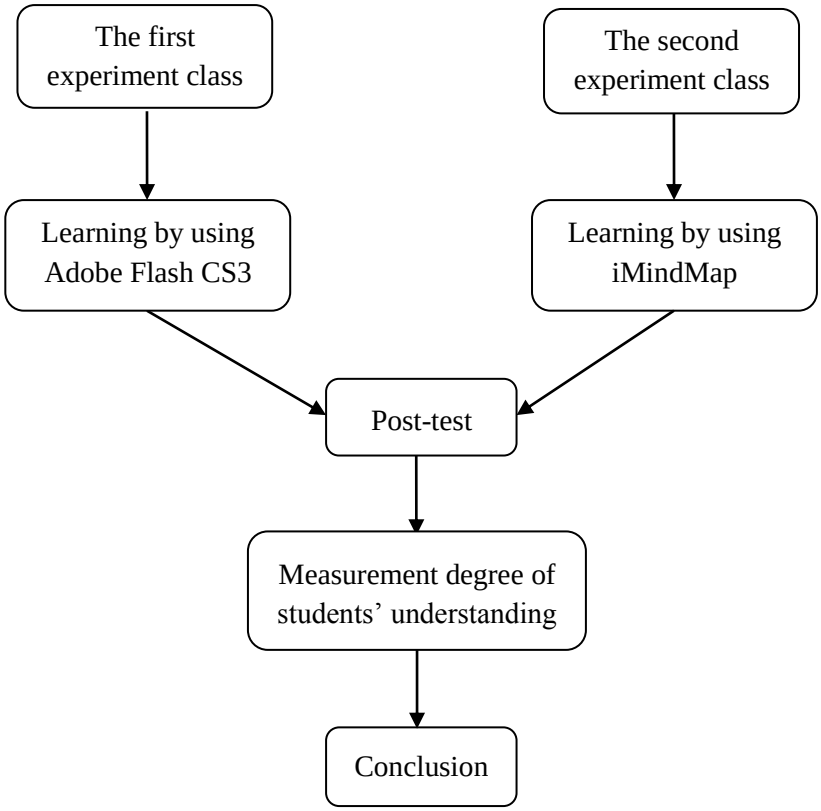

Figure 2.13 The Frame of Thinking

C. Previous Research

After doing an investigation, there are many researches that have been conducted related to the learning media. From the search results were found some research that there are similarities with the research problem to be studied, namely the problem of learning media and the students' understanding. The results of the research are:

1. Perbandingan Prestasi Belajar Siswa antara yang Menggunakan Macromedia Flash 8 dengan Alat Peraga Benda Tiga Dimensi (Studi Eksperimen Kelas VII di SMP Negeri 6 Kota Cirebon). Investigated by

Asep Heriyanto, Student Mathematics Education Department of Tarbiyah Faculty of IAIN Syekh Nurjati Cirebon in 2012. The results of data analysis using Independent Sample T-Test, known that t_{count} of 3.903. While the value of t_{tabel} with a significant level of 5% is obtained = 1.99 and 79 degrees of freedom. Thus the value of $t_{count} > t_{table}$, namely 3.902 > 1.99 then H_o is rejected. It means that there is a difference the students' mathematics achievement at the class using learning media of Macromedia Flash and the class using learning media of three-dimensional objects kit. The results of learning using Macromedia Flash are higher than using three-dimensional objects kit. (Asep Heriyanto, 2012: abstract)

2. Pengaruh Pembelajaran Menggunakan Model Peta Pikiran (*Mind Mapping*) terhadap Peningkatan Kemampuan Pemahaman Matematis Siswa. Investigated by Fitriana Lestari, Student Mathematics Education Department of FPMIPA Faculty of UPI Bandung in 2012. Methods of experimental research using design of control group by pretest-posttest, at the topic of quadrilateral in SMPN 2 Lembang. The results of the research based on pretest of prior knowledge at the experiment class and the control class are equal, after doing special treatment at the experiment class i.e. learning process using model of mind maps, obtained the average of post-test results the experiment class of 29.77. While the control class doesn't get special treatment just using conventional learning, obtained the average of post-test results the control class of

25.81. For the average value of gain index the experiment class of 0.615, while the average value of gain index the control class of 0.403. From the average of the post-test results showed that the students' understanding ability of mathematics at the experiment class are better than the students at the control class, while the criteria for improvement based on the average gain's index, namely the experimental class is higher than the control class (Fitriana Lestari, 2012: abstract).

3. Pengaruh Penerapan Multimedia *Macromedia Flash* terhadap Perkembangan Persepsi Visual Siswa dalam Pemebelajaran Matematika. Investigated by Raswati, Student Mathematics Education Department of Tarbiyah Faculty of UIN Syarif Hidayatullah Jakarta. This research was conducted in SD IT Roudhotul Jannah Bekasi in the academic year 2009/2010. This reserach used two groups : the experimental group (mathematics learning with multimedia Macromedia Flash) and the control group (mathematics learning with multimedia PowerPoint), with each group consists of 30 students. The experimental group was selected based on the results of pre-research using Frostig test as a test instrument in the research. Frostig test is used to measure five abilities of visual perception, there are eyes movement coordination, background image, shape recognition, the position of objects in space and space relations. The results showed that $t_{count} > t_{table}$ (3.05 > 2.00), so H_o is rejected. This means that the average level of development of visual perception at the students using multimedia Macromedia Flash is higher than the average

level of development of visual perception at the students using multimedia PowerPoint, especially in mathematics learning. In other words, the process of learning mathematics using multimedia Macromedia Flash can affect the level of development of students' visual perception are significantly higher than using multimedia PowerPoint. (Raswati, 2010: abstract)

4. Pengaruh Pembelajaran dengan Bantuan Program *Adobe Flash CS3* terhadap Hasil Belajar Siswa pada Pokok Bahasan Himpunan (Study Eksperimen Siswa Kelas VII SMP Negeri 3 Tanjong). Investigated by Siti Izzatun Ni'mah, Student Mathematics Education Department of Tarbiyah Faculty of IAIN Syekh Nurjati Cirebon in 2011. From the results obtained, it is known that the students' average of mathematics achievement in class VII C as experiment class are superior than the students' average of learning outcomes in class VII B as a control class, namely 63.79 > 61.68. From the results data obtained, there is significant influence using of learning media with program Adobe Flash CS3 at SMP Negeri 3 Tanjong toward the students' learning outcomes. (Siti Izzatun Ni'mah, 2011: abstract).
5. Pengaruh pembelajaran Matematika Realistik (PMR) terhadap Pemahaman Matematika (Studi Eksperimen di Kelas VIII SMPN 1 Sindangagung Kabupaten Kuningan). Investigated by Tia Pitria Junita, Student Mathematics Education Department of Tarbiyah Faculty of IAIN Syekh Nurjati Cirebon in 2012. From the research results are known that

students' understanding of mathematics at the topic of cubes and rectangular prisms in Class VIII SMPN 1 Sindangagung Kuningan Regency mostly are good with percentage of 70.11% and the average value of the test result of 67.5 (Tia Pitria Junita, 2012: abstract).

From the fifth search results above, no exact match between the variable X which is learning media that is used and the variable Y is variable that you want to measure. Although there are similarities only one of the variables is not exactly everything and targets as well as the location of the research are also different, because the researcher using different medias are Adobe Flash CS3 and iMindMap to measure the students' understanding. Therefore, the study entitled in "The Comparative Study between Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function (Experimental Study at Science Eleventh Class of *SMAN 5 Kota Cirebon*)" is worth doing because of the problem to be studied is not duplication of research that has been done before.

D. The Hypothesis of Research

Sugiyono (2012 : 96) states that "hypothesis is a temporary answer to the formulation of research problems, in which the formulation of research problems have been expressed in the form of the question sentence". Based on the theories and the frame of thinking that have been described above, then hypothesis will be proposed and tested truth is: there is a difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap in learning.

CHAPTER III
THE METHODOLOGY OF THE RESEARCH

A. The Place and Time of the Research

1. The Place of the Research

The research was carried out at *SMAN 5 Kota Cirebon* at Science eleventh class in the second semester of academic year 2012/2013. It is located on Perjuangan street, Majasem Cirebon city. Where facilities and infrastructure owned by *SMAN 5 Kota Cirebon* are adequate for the implementation of teaching and learning activities properly and effectively.

2. The Time of the Research

Planning and the time were required to complete this research report for 5 months, starting from February to June 2013. This research is located at *SMAN 5 Kota Cirebon*. As for the schedule of research is as follows:

Tabel 3.1
The Schedule of the Research

No	Name of the activity	February				March				April				May				June			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1.	Prepared for media																				
2.	Observation and permissions																				
3	Guidance instruments																				

4.	Trial of instrument																		
5.	Experiment teaching																		
6.	Post-test																		
7.	Collecting of the data																		
8	Data analysis																		
9	Preparation of report																		

B. The Method and Design of the Research

1. The Method of the Research

According to Suharsimi Arikunto (2010: 203), the method of research is the way used by researcher in collecting data of research. The method was used in this research used experimental methods by quantitative approach. The researcher divided the research group into two groups, namely the first experimental group using Adobe Flash CS3 in learning and the second experimental group using iMindMap.

2. The Design of the Research

The design of this research was *two-shots case study* using experiment class. This research required two experiments classes and just did a post-test. The design of research used was:

RE_1 : X_1 O_1

RE_2 : X_2 O_2

(Sugiyono, 2012: 110)

Description :

RE_1 : The group of experimental 1st

RE_2 : The group of experimental 2nd

O_1 : Post-test on the group of experimental 1st

O_2 : Post-test on the group of experimental 2nd

X_1 : Treatment using Adobe Flash CS3

X_2 : Treatment using iMindMap

C. The Population and Sample of the Research

1. The Population of the Research

The population is the total of all subject and object of the research. According to Sugiyono (2012: 117) population, is a generalizations that consist of : object or subject having quality and certain characteristic that are determined by researcher to be studied and then inferred. The population in this research was all the students of class *XI IPA SMAN 5 Kota Cirebon* in the second semester of academic year 2012/2013 that consists of four classes *XI IPA* that was a total of 134 students.

Table 3.2 : Number of Students in Class XI IPA

Gender	Class XI IPA				Total
	1	2	3	4	
Female	23	23	24	22	92
Male	11	12	10	9	42
Total	34	35	34	31	134

Source : The administration of *SMAN 5 Kota Cirebon*

2. The Sample of the Research

According to Sugiyono (2012 : 118), sample is part of number and characteristic which has its population. If a large population, and the researcher may not be learned all that is in the population, for example due to limitations in funding, effort and time, then researcher can use samples taken from the population. While according to Riduan (2008: 10) concluded that the sample is part of the population that has the characteristics or certain condition will be studied.

Based on the understanding of the population and sample above, in this research the researcher took sample by using *cluster random sampling* which was sample taken based on the group or class, not the subject or individual. From the four classes, two classes would be taken as a sample to get the first experiment class and the second experiment class. Based on random sampling was chosen class *XI IPA 3* as the first experiment using Adobe Flash CS3 that has number of 34 students and class *XI IPA 4* as the second experiment using iMindMap that has number of 31 students.

D. The Research Instruments

The research instrument is an instrument used to collect data. According to Sugiyono (2012: 193), there are two main things that influence the quality of the research data, namely the quality of the research instrument and the quality of data collection. The quality of research instruments related to validity and reliability of the instrument and the quality of data collection

related to the ways accuracy used to collect data. Therefore, instruments have been proven the validity and reliability, may not necessarily generate valid and reliable data, if the instrument is not used appropriately in the data collection.

1. The Conceptual Definition
    a. Adobe Flash CS3 is a program that is used for making animation in this case namely can be utilized in using of learning media
    b. iMindMap is a program or application used to create digitally mind mapping with the help of computers. iMindMap is used to present the material and as technical notes that is effective and efficient.
    c. The students' understanding of mathematics are a benchmark in the students' achievement in receiving of mathematics material that is presented by the teacher in the learning process.
2. The Operational Definition
    a. The use of Adobe Flash CS3 in learning at the topic of the limit of function.
    b. The use of software iMindMap in learning at the topic of the limit of function.
    c. The students' understanding of mathematics are the total score obtained by the students after solving math problems are given by researcher to the respondent.

3. The Research Instrument used

Based on the research purpose has been delivered, to obtain the data is required a data collection tool i.e mathematics achievement test and observation. The use of achievement test is to measure the level of students's understanding through cognitive aspect after doing the learning process by using Adobe Flash CS3 and iMindMap software. While the observation, researcher collects the data related to the objective conditions about situation mathematics learning is usually used by teachers in delivering material at class *XI IPA SMAN 5 Kota Cirebon.*

4. The Lattice instrument

The lattice instrument is prepared as a reference for the researcher in developing the data collection instruments. The preparation is based on the underlying theory and aspects/indicators that have been outlined in Chapter II. For more details can be found in appendix A.4.

5. The Instruments Test

a. Validity Test

According to Suharsimi Arikunto (2010: 60), validity is a measure that indicates the level of validity of an instrument. An instrument is valid if it is able to measure what they want and express the observed data and variables appropriately. To measure the validity of this research using the formula product moment correlation:

$$r_{xy} = \frac{n\sum XY - (\sum X \times \sum Y)}{\sqrt{[(n\sum X^2) - (\sum X)^2][(n\sum Y^2) - (\sum Y)^2]}}$$

(Riduan, 2008 : 227)

Where:

r_{xy} = The correlation coefficient of items

N = The number of subjects

X = Score of items

Y = Score total

If $r_{count} > r_{table}$ then item question is valid, and in other item question is invalid. In addition to using the formula manually above, the researcher uses software IBM SPSS Statistics 19.0, while the steps are as follows:

1) Open program IBM SPSS Statistics 19.0
2) Click the *Variable View* in SPSS editor.
3) At the column *Name* type item 1, item 2, item 3, until the last item and score.
4) Change numbers at the column *Decimal* to zero and ignore the other columns.
5) Open the *data view* in SPSS Data Editor.
6) Input data according to variables.
7) Click *Analyze* - *Corelate* - *Bivariate.*
8) Select all the variables and inputs to the column variable.
9) Click *OK*.

(Duwi Priyatno, 2010 : 93)

Based on calculation to the validity test by using software IBM SPSS Statistics 19 that is done on the 34 students (r_{table} = 0.334) in class *XI IPA 2 SMAN 5 Kota Cirebon* with significant level = 5%, obtained that from the 15 questions are tested and there are 4 invalid questions which item no. 1, 2, 3, and 13, because $r_{count} < r_{table}$. While the item is declared valid questions are no. 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15, because $r_{count} > r_{table}$. For more calculations can be found in appendix D.3.

Table 3.3

The Calculation Result of the Validity Test in Essay

No. Item	r_{xy}	N	Criteria
1	-0.018	0.334	Invalid
2	-0.029	0.334	Invalid
3	0.021	0.334	Invalid
4	0.597	0.334	Valid
5	0.622	0.334	Valid
6	0.726	0.334	Valid
7	0.693	0.334	Valid
8	0.545	0.334	Valid
9	0.665	0.334	Valid
10	0.546	0.334	Valid
11	0.508	0.334	Valid
12	0.652	0.334	Valid
13	0.291	0.334	Invalid
14	0.790	0.334	Valid
15	0.634	0.334	Valid

b. Reliability Test

According to Sugiyono (2012: 173), the reliable instrument is an instrument when used several times to measure the same object, will result the same data. To calculate the reliability test, the researcher uses the formula Alpha Croanbach is as follows:

$$r_{11} = \left[\frac{k}{k-1}\right]\left[1 - \frac{\sum s_1^{\,2}}{s_t^{\,2}}\right]$$

Sugiyono (2013 : 365)

Description:

R_{11} : The coefficient of reliability

k : The number of items

$\sum s_1^{\,2}$: The number of variance from the item scores

S_t^2 : The number of variance from the total score

The results of calculation the data furthermore is classified by following reliability coefficient ia as follows :

Table 3.4

The Classification of the Reliability Coefficient

Value	Criteria
$0{,}90 \leq r_{count} \leq 1{,}00$	Very high
$0{,}70 \leq r_{count} < 0{,}90$	High
$0{,}40 \leq r_{count} < 0{,}70$	Medium
$0{,}90 \leq r_{count} < 0{,}40$	Low
$r_{count} < 0{,}20$	Very low

To test the reliability can also use program IBM SPSS statistics 19.0 with the following steps:

1) Click *Analyze - Scale - Reliability Analysis*
2) Click *Statistics* on *Descriptive For* click *Scale if item deleted*
3) Click *Continue, OK*

Buono Agung (2005: 73)

Based on the analysis of test reliability on the instrument test of understanding mathematics by using the software IBM SPSS Statistics 19, obtained that the Cronbach's Alpha reliability coefficient of 0.815. The value of the instrument reliability belongs to the high category and reliable for use in research. For more calculations can be found in appendix D.4.

c. The Difficulty Index

To find out the questions are easy or difficult need to be seen from the level of difficulty of the questions. Good questions are the questions that are not too easy nor too difficult. In this research calculation the level of difficulty question using the following formula:

$$IK = \frac{\bar{x}}{SMI}$$

Suherman (2003 : 170)

Description:

IK : The difficulty index

$\bar{x}$: Mean score of each item

SM : Ideal score (maximum score)

With the difficulty index criteria are:

Table 3.5

The Criteria of the Difficulty Index

Value IK	Criteria
IK = 0.00	Very difficult
0.00 ≤ IK < 0.30	Difficult
0.30 ≤ IK < 0.70	Medium
0.70 ≤ IK < 1.00	Easy
IK = 1.00	Very Easy

Based on calculation the difficulty index in appendix D.5 is known that there are some easy criteria problem that consists of numbers 1, 2, 3 and 13. Questions with the medium criteria are numbers 4, 5, 6, 7, 8, 9, 10, 11 and 14. As for the difficult criteria which consists of numbers 12, and 15. For more calculation can be found in appendix D.5.

Table 3.6

The Calculation Result of The Difficulty Index in Class *XI IPA 2*

No. Item	Mean Score	SMI	IK	Criteria
1	5.971	6	0.995	Easy
2	5.6	6	0.933	Easy
3	5.37	6	0.895	Easy
4	3.7	6	0.616	Medium
5	3.69	6	0.615	Medium
6	2.97	8	0.371	Medium
7	3.14	6	0.523	Medium
8	3.26	6	0.543	Medium
9	2.97	8	0.371	Medium
10	2.5	6	0.416	Medium
11	2.51	6	0.418	Medium
12	2.29	8	0.286	Difficult
13	5.43	6	0.905	Easy
14	3.43	8	0.428	Medium
15	1.46	8	0.182	Difficult

d. The Differentiator

According to Suharsimi Arikunto (2010: 211), the differentiator is ability of a problem to distinguish between high-ability students and low-ability students. Amount members of the upper group and lower group are taken respectively by 27% of the total respondents after the data results of trial instruments is sorted, then it generates students in the on group and students in the under

group. (Nana Sudjana, 2004 :139). To calculate the distinguishing power be used formula:

$$DP = \frac{\bar{x}_a - \bar{x}_b}{SMI}$$ Suherman (2003 : 161)

Description:

DP = The differentiator

$\bar{x}_a$ = Mean score of the students group on

$\bar{x}_b$ = Mean score of the students group under

SMI = Score Ideal (Maximum Score)

With the differentiator criteria are as following:

Table 3.7

The Criteria of the Differentiator

Value DP	Criteria
DP < 0.00	Very Bad
0.00 ≤ DP < 0.20	Bad
0.20 ≤ DP < 0.40	Enough
0.40 ≤ DP < 0.70	Good
0.70 ≤ DP < 1.00	Very good

Based on calculations the distinguishing test in Appendix D.6, known that there is 1 question belongs to the very bad category that is no.2, for the bad category is questions no. 1 and 3, questions in the enough category are no. 9, 10, 11 and 13. As for the question no. 4, 5, 6, 7, 8, 12 and 15 belong to the good category questions and question

no. 14 is the excellent category. For more calculation can be found in appendix D.6.

Table 3.8

The Calculation Result of the Differentiator in Class *XI IPA 2*

No. Item	$\bar{X}_a$	$\bar{X}_b$	SMI	DP	Criteria
1	6	6	6	0	Bad
2	5.77	6	6	-0.037	Very Bad
3	5.78	5.6	6	0.0003	Bad
4	6	3.2	6	0.4666	Good
5	4.9	2	6	0.4833	Good
6	5.22	1.7	8	0.44	Good
7	4.89	2	6	0.4816	Good
8	4.2	0.9	6	0.55	Good
9	5.11	2.3	8	0.3512	Enough
10	3.67	2	6	0.2783	Enough
11	3.33	1.5	6	0.305	Enough
12	4.67	1	8	0.4587	Good
13	6	4.8	6	0.2	Enough
14	6.67	0.3	8	0.7962	Very Good
15	4.11	0	8	0.5137	Good

E. The Techniques of Collection the Data

The technique of collection the data is the most important thing in a research. To get the data objectively and correctly, then it must be considered seriously the collection techniques. In the technique of collection data researcher uses instruments in the form of a written test. The written test is used to measure the degree of students' understanding through the students'

mathematics achievement. In addition to, the written test the researcher doing observation, the researcher collects data related to the objective conditions about the situation of learning mathematics.

1. The Written Test

According to Heri Jauhari (2010: 156), the test is an instrument of collection data in the research to measure the knowledge, experience, and skills of the respondents. The kind of test is usually form of tests essay, multiple choice, and important tasks that can be used to test or measure the ability of the respondent. This test is done to measure the degree of the students' understanding of mathematics at the topic of the limit of function after implementing the learning by using Adobe Flash CS3 and iMindMap.

F. The Techniques of Analysis the Data

1. The Prerequisite Test

a. Normality Test

According to Ruseffendi (2005: 294), normality test is used to find out whether the selected sample is normally distributed or not. If the data is observed normally distributed, then the data furthermore can be analyzed using parametric statistics but if the data is observed not normally distributed, then the parametric statistics can't be used, then furthermore using nonparametric statistics (Sugiyono, 2013: 79). Normality test can be done by using

the Kolmorogorov-Smirnov method, the test statistic is D value of defined as follows:

$$D = Sup_x \left| F_n(x) - F(x) \right|$$

Where:

D = The deviation value of absolute maximum

Fn = The distribution function of commutative empirical

F = The theoretical commutative probability function and normal distribution

(J.P. Marques de Sa. 2003 :183)

Normality hypothesis used is:

H_o = The data is not normally distributed

H_a = Normally distributed data

Normality testing criteria used are:

1) If the value of *Prob* / *Significance* / *P-value* < 0.05, then abnormal data
2) If the value of *Prob* / *Significance* / *P-value* > 0.05, then normal data

The researcher uses the help of software IBM SPSS Statistics 19 to normality test. As for the steps used are as follows:

1) Click *Analyze - Descriptive Statistics – Explore*
2) Input variables *Standardized Residuals* at column *Dependent List*.
3) Click the button *Plot*

4) Click *Normality Plot With Test*

5) Click *OK*

(Sofyan Yamin et al., 2011 : 11)

b. Homogeneity Test

Homogeneity test is conducted to find out whether a sample of one to the another have a similar or not. Homogeneity testing can use test Levene is as follows:

$$L = \frac{(N-K)\sum_{i=1}^{k} Ni(Zi - Z.....)^2}{(k-1)\sum_{i=1}^{k}\sum_{j=1}^{Ni}(Zij - Zi)^2}$$

(J.P. Marques de Sa, 2003 :130)

Description:

L = The value of Levene count

X = The value of data residuals

$\overline{X}$ = Mean of data residuals

N = The number of samples

K = The number of groups

If the value of Levene count obtained then compared to the Levene table or can also use the comparison of significance with an alpha value of 5%. If Levene count < Levene table or L value > 5%, then the data varies homogeneous.

As for the steps of homogeneity test using software IBM SPSS Statistics 19.0 is as follows:

1) Input the data in SPSS Worksheet
2) Click *Analyze - Compare Mean - One Way Anova*

   then fill part *Dependent List* with variable Y and parts *Factor list* with variable Y of scala
3) Click *Option - Homogeneity of variance test – Continue*
4) click *OK*

   (Duwi Priyatno, 2010 : 78)

2. The Test of Hypothesis

The data has been tested the prerequisite analysis, then it will be tested hypothesis appropriate with the criteria of the results obtained. Hypothesis is a provisional conclusion that the truth remains to be tested. The test of hypothesis is used *Independent Sample T Test* as follows:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1 - 1)s_1^{\,2} + (n_2 - 1)s_2^{\,2}}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

(Sugiyono, 2013 : 138)

Description :

$\bar{X}_1$ = Mean of the class using Adobe Flash CS3 in learning

$\bar{X}_2$ = Mean of the class using iMindMap in learning

S = Varians

n_1 = The number of students using Adobe Flash C3 in learning

n_2 = The number of students using iMindMap in learning

Hypothesis is:

H_o = There is no difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap in learning.

H_a = There is a difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap in learning.

The decision making, namely:

1) If $-t_{table} < t_{count} < t_{table}$, then H_a is rejected, the meaning that there is no significant difference
2) If $t_{count} > t_{table}$, or $-t_{count} < -t_{table}$, then H_o is rejected, the meaning that there is significant difference.

As for the steps to test the hypothesis by using the help of software IBM SPSS Statistics 19.0 is as follows:

1) Input the data in SPSS Worksheet
2) Click *Analyze menu - Compare mean - Independent sample T Test*, then fill values in the Test Variable (s) and classes for grouping Variable
3) Then click *Define Groups* and type 1 in *group* 1 and type 2 in *group* 2.
4) Then click *continue,* click *OK*

(Duwi Priyatno, 2010 : 32)

G. Statistical Hypothesis

A statistically hypothesis is stated as follows:

$H_o : \mu_a = \mu_b$

$H_a : \mu_a \neq \mu_b$

Description :

H_o = Null hypothesis

H_a = Alternative hypothesis

μ_a = Mean score of students at the first experiment class using Adobe Flash CS3

μ_b = Mean score of students at the second experiment class using iMindMap

CHAPTER IV
THE RESEARCH FINDINGS

A. Description of Data

The result of data was obtained by researcher in field, this was from both post-test at the experiment classes in class *XI IPA SMAN 5 Kota Cirebon*. The first experiment class is class *XI IPA 3* using Adobe Flash CS3 in learning. While the second experiment class is class *XI IPA 4* using iMindMap in learning. In this research, the researcher used experimental method by quantitative approach.

This research aims to know the difference between The students' understanding of mathematics by using Adobe Flash CS3 and iMindMap at the topic of the limit of function. The students' understanding of mathematics are obtained from the data result of the test is given after learning to use Adobe Flash CS3 and iMindMap in learning.

1. The Data of Post-test the First Experiment Class Using Adobe Flash CS3 in Class XI IPA 3

The data of the students' understanding of mathematics is obtained by researcher after the treatment using Adobe Flash CS3 in learning mathematics at the topic of limit of function. Descriptive statistics of the students' understanding data of mathematics are the following table:

Tabel 4.1

Descriptive Statistics Adobe Flash CS3

	Adobe Flash CS3	Valid N (listwise)
N	34	34
Minimum	52	
Maximum	91	
Sum	2285	
Mean	67.21	
Median	66	
Std. Deviation	10.642	
Variance	113.259	

Based on the table above, known that mean of the 34 students of class *XI IPA* 3 is equal to 67.21 with a standard deviation of 10.642 and a median of 66. The highest value is 91 and the lowest value is 52 from an interval value is given of 0-100 and variance of 113.259. Those values are included in a good categories. For more data can be found in appendix E.1.

2. The Data of Post-test the Second Experiment Class Using iMindMap in Class XI IPA 4

The data of the students' understanding of mathematics is obtained by researcher after the treatment using iMindMap in learning mathematics at the topic of the limit of function. Descriptive statistics of the students' understanding data of mathematics are the following table:

Tabel 4.2

Descriptive Statistics iMindMap

	iMindMap	Valid N (listwise)
N	31	31
Minimum	41	
Maximum	82	
Sum	1892	
Mean	61.03	
Median	58	
Std. Deviation	11.217	
Variance	125.832	

Based on the table above, known that mean of the 31 students of class *XI IPA* 3 is equal to 61.03 with a standard deviation of 11.217 and a median of 58. The highest value is 82 and the lowest value is 41 from an interval value is given of 0-100 and variance of 125.832. Those values are included in a medium categories. For more data can be found in appendix E.2.

B. The Final Design of Learning Media

1. The Design of Learning Media Using Adobe Flash CS3

The final result of the design of learning media using Adobe Flash CS3 is an application of learning at the topic of the limit of function. It will can be used in the experimental study in class *XI IPA 3*. This application can run on Windows, Mac OS or Linux using program flash player is already installed on your laptop or computer. As for minimum specification is required to run the application is 1). Processor

Intel Pentium IV or similar, 2). RAM memory 512 MB, 3). On board VGA, 4) Speaker or sound card. 5). Keyboard, 6). Mouse, 7). Hard Disk 8). Projector.

To run this application in windows, just simply double click file flash of function limit that has extension of exe or swf, then will appear as follows:

Figure 4.1 The Display of the First Page

This page is the first display of interactive learning media *SMA/MA* at the topic of the limit of function in Class *XI IPA*. In this learning media, we start from the enter menu, then click it.

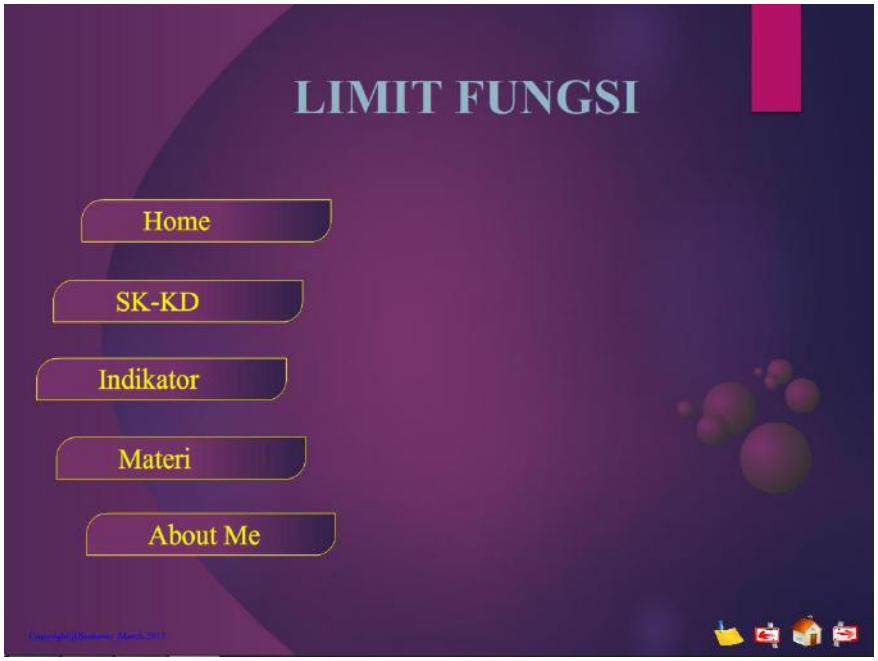

Figure 4.2 The Display of Introduction Page

This page contains Home button, *SK-KD*, Indicators, Materials and About me. Users can choose according to what will be learned based on *KTSP* curriculum.

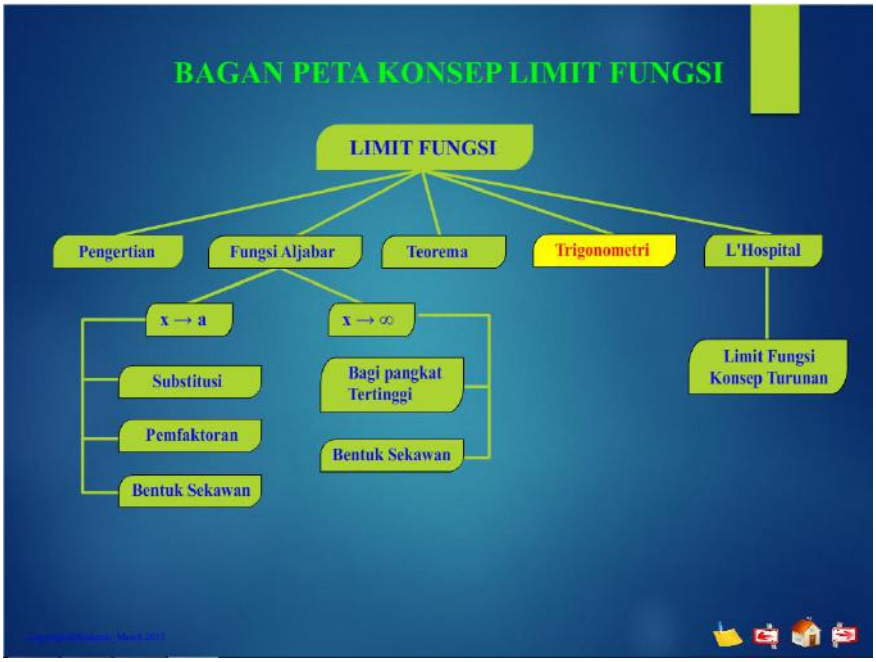

Figure 4.3 The Display of Materials Page

This page contains a map concept of the limit of function and as material start menu. The purpose of this page is to facilitate students in learning whole the material of limit using map concept. Users can also choose sub-material what will be learned by pointing the cursor to the menu and click it.

Figure 4.4 The Display of Page *SK-KD*

This page contains standard competence and based competence at material of the limit of function based on curriculum used it, namely *KTSP* curriculum. Curriculum as the planned and guided learning experiences and intended outcomes, formulated through the systematic reconstruction of knowledge and experiences under the auspices of the school, for the learners' continuous and wilful growth in personal social competence.

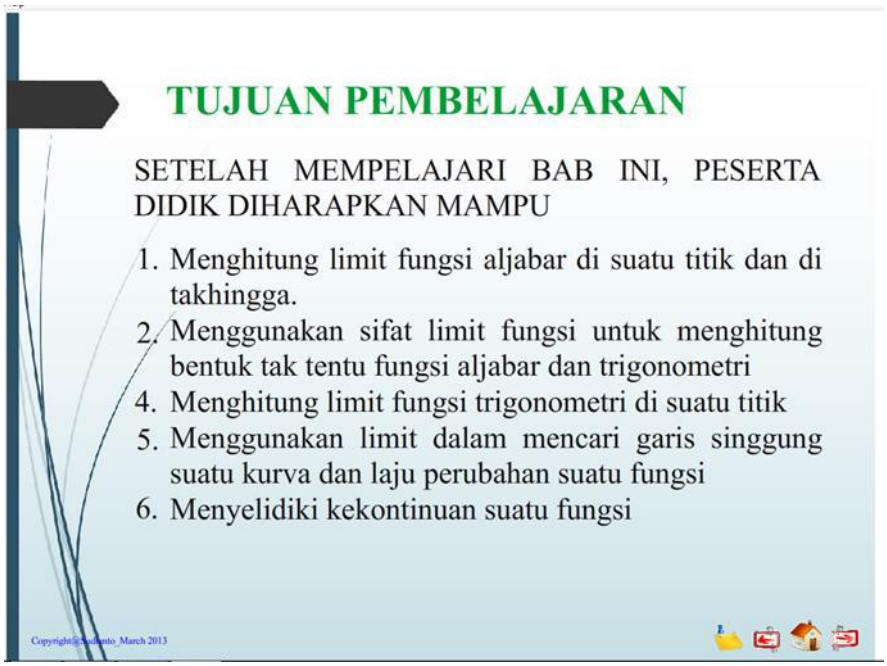

Figure 4.5 The Display of Learning Objectives

This page contains learning objectives will be achieved by students after implementing the learning activities based on *KTSP* curriculum

Figure 4.6 The Display of Limit Definition

This page is home page from definition of the limit of function

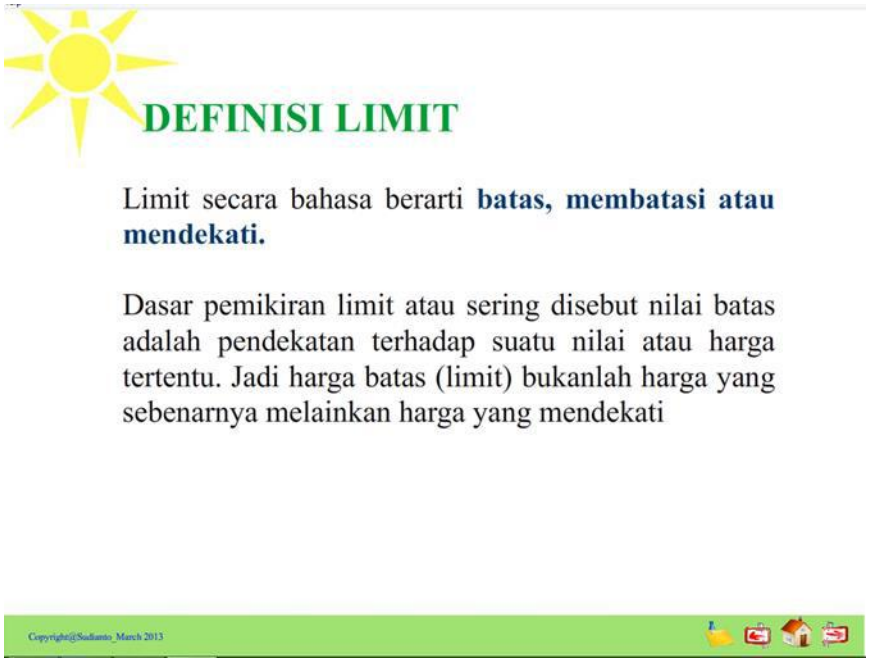

Figure 4.7 The Display of Limit Definition Etymologically

This page contains definition of the limit of function etymologically and the rationale about the limit of function.

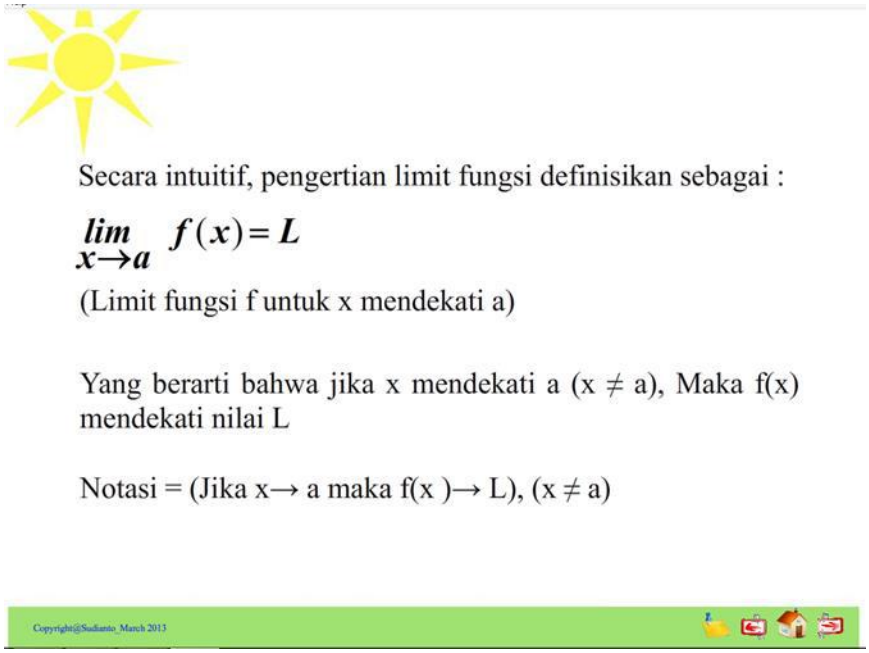

Figure 4.8 The Display of Limit Definition Intuitively

This page contains definition of the limit of functions intuitively

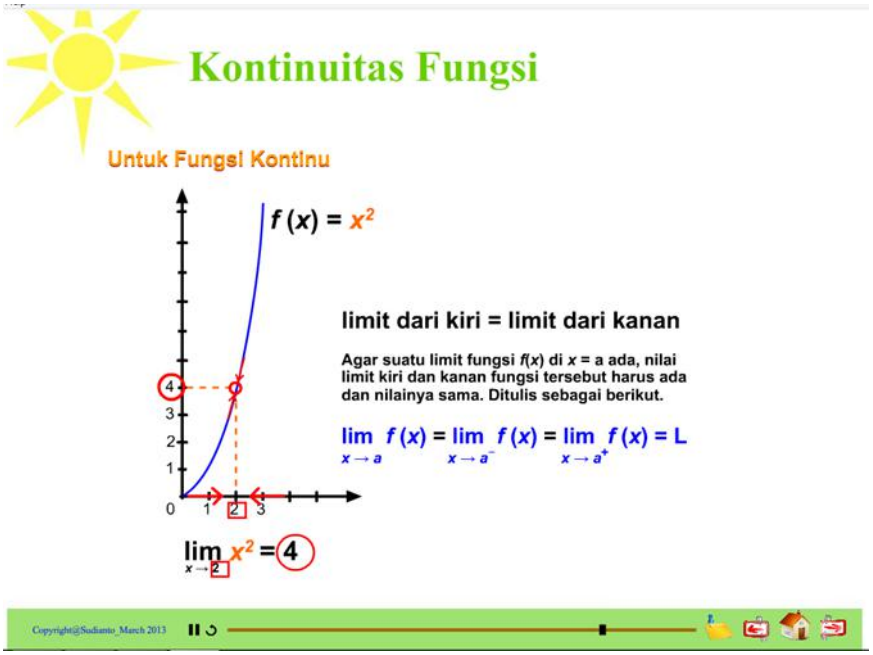

Figure 4.9 The Display of Continuous Function

This page contains requirements for a continuous function by using graph is the right limit equal to the left limit.

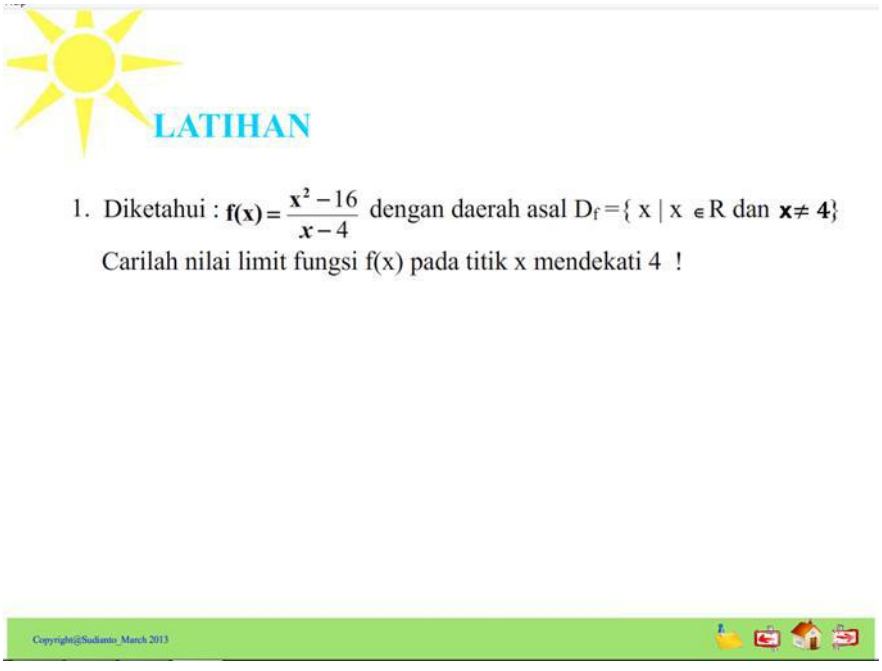

Figure 4.10 The Display of Exercise of the Definition of Limit

This page contains an exercise that calculate the limit of function through an approach around the point by using tables and graphs.

Figure 4.11 The Display of the Limit of Algebraic Function

This page is the home page of the limit of algebraic function .

Figure 4.12 The Display of the Limit of Algebraic Function

This page contains the material will be studied in the limit of algebraic function.

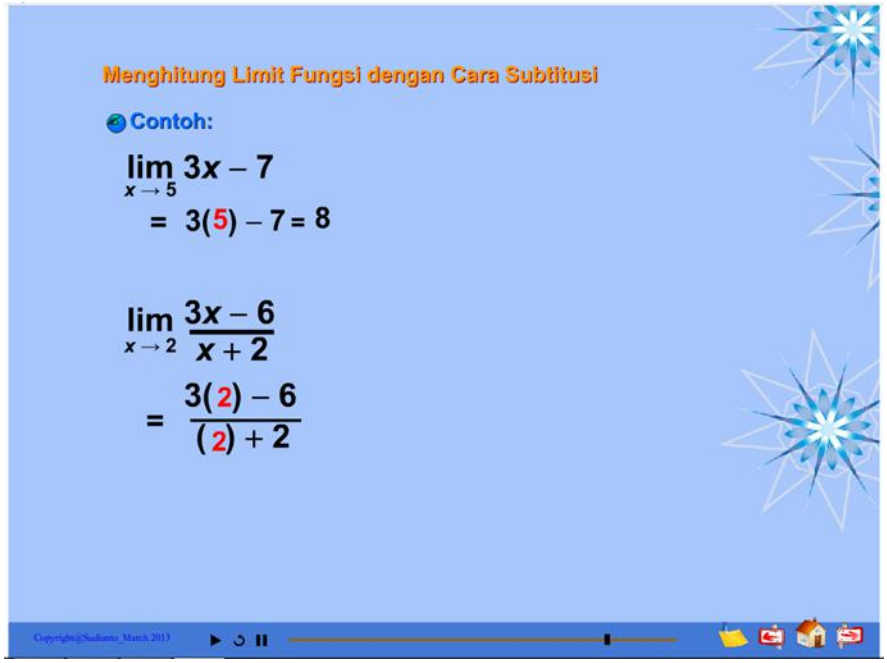

Figure 4.13 The Display of Substitution Page

This page contains a solution limit of algebraic function using substitution directly.

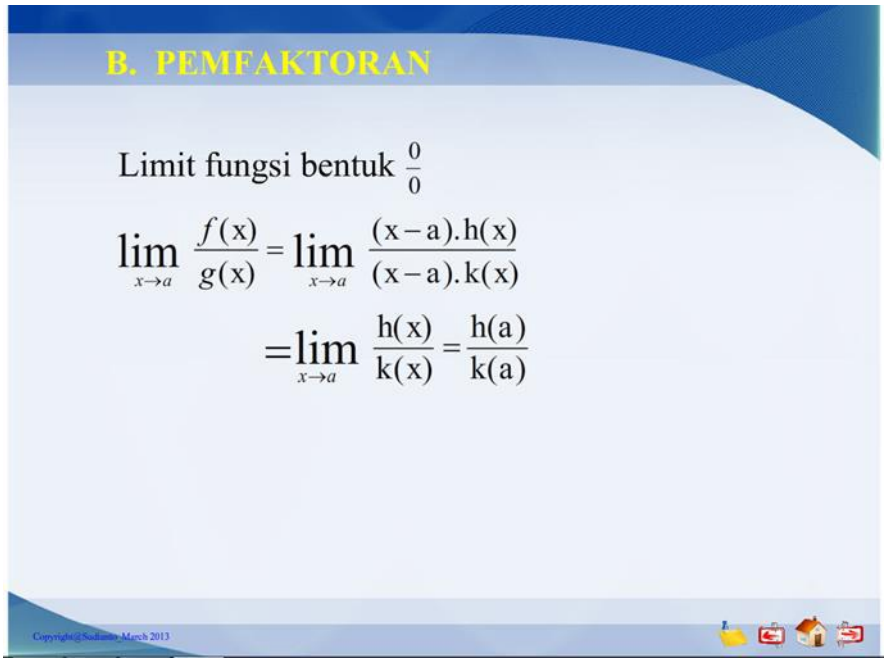

Figure 4.14 The Display of Factorization Page

This page contains solution concept of the limit of algebraic function using factorization.

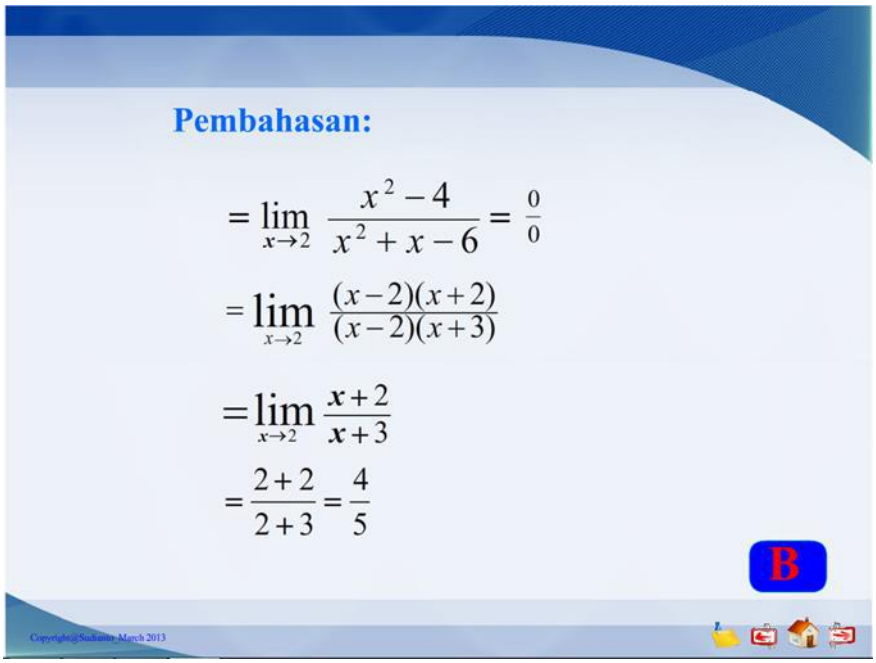

Figure 4.15 The Display of Exercise and Solution by Factorization

This page contains exercise and solution of the limit of algebraic function by using factorization.

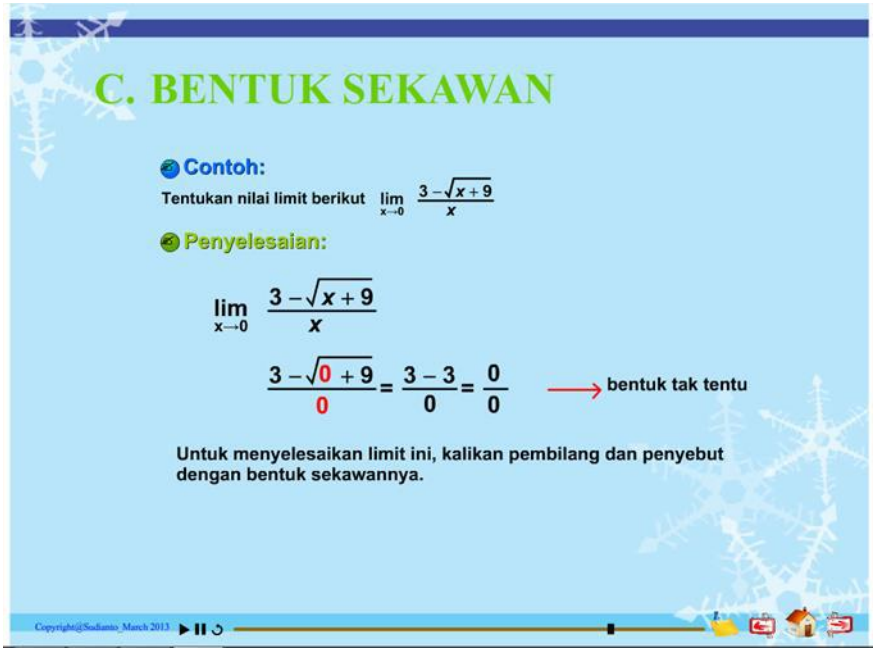

Figure 4.16 The Display of Conjugate Page

This page contains examples about using solution by multiplying its conjugate

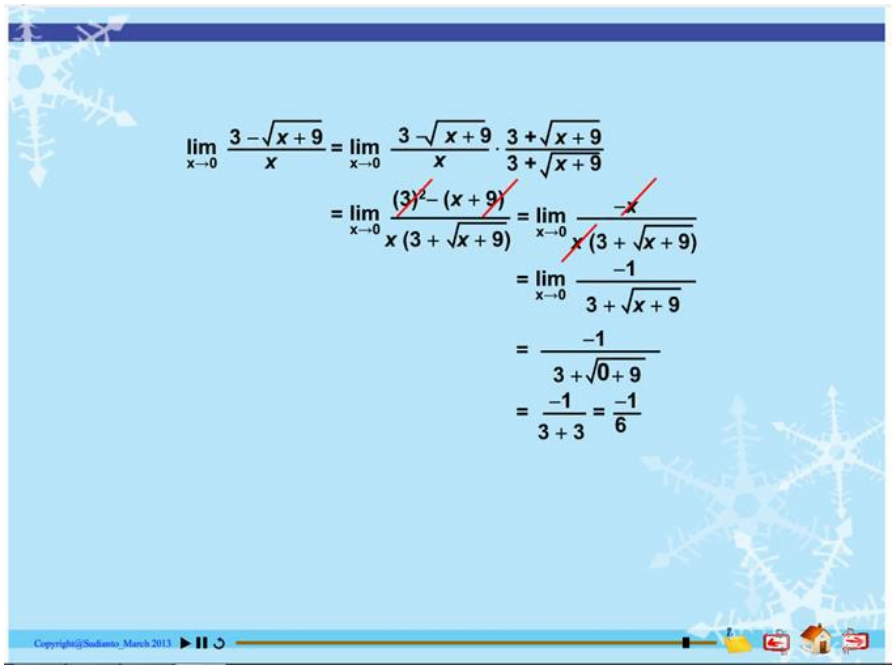

Figure 4.17 The Display of Multiplying Conjugate

This page contains a solution of the limit of function by multiplying its conjugate.

Figure 4.18 The Display of Homepage in Limit Theorem

This Page is Homepage of the Theorem of Function Limit

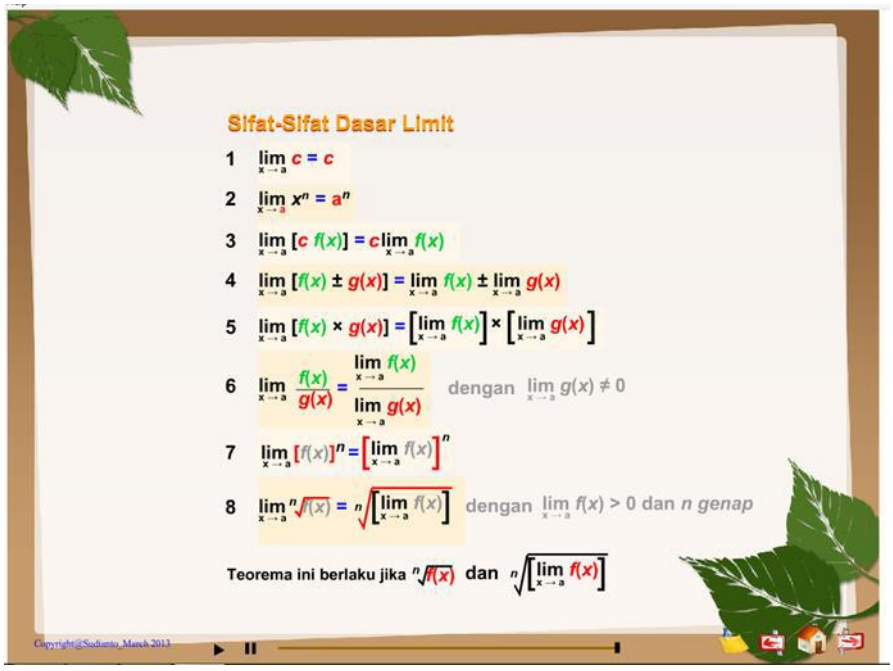

Figure 4.19 The Display of the Theorems of Limit

This page contains theorems that are used to assist in resolving exercise of the limit of function.

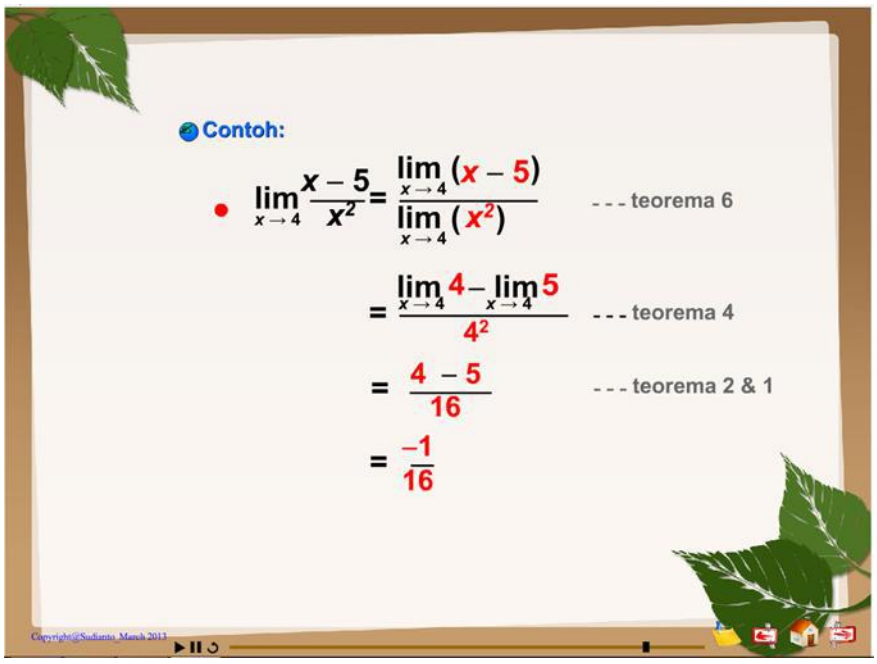

Figure 4.20 The Display of Example the Theorems of Limit

This page contains examples about using the teorms in calculating the limit of function

Figure 4.21 The Display of the Infinite Limit

This page is homepage of the infinite limit of function

Figure 4.22 The Display of the Infinite Limit Concept

This page contains concepts in the infinite limit

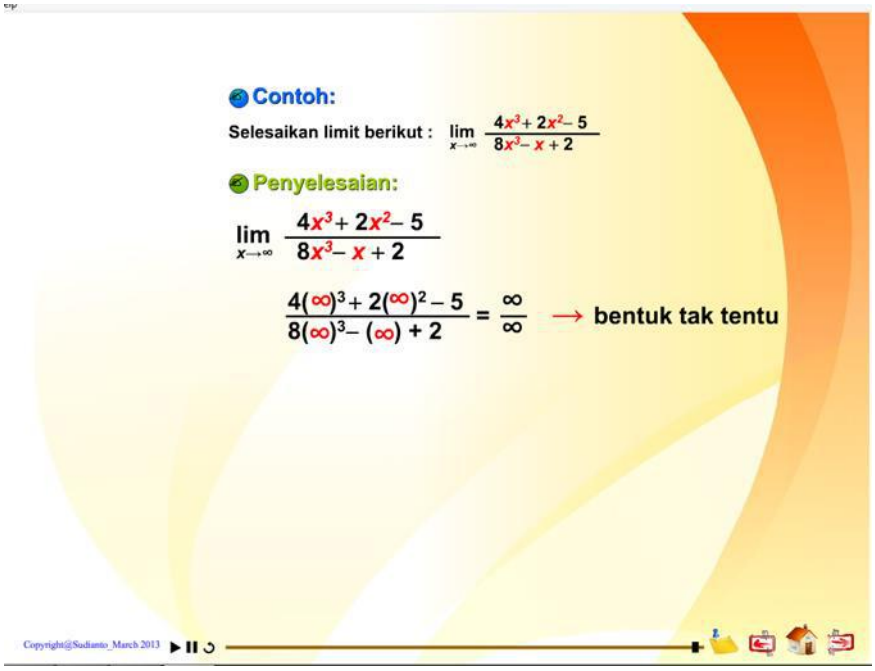

Figure 4.23 The Display of Examples in the Infinite Limit

This page contains examples the infinite limit of function

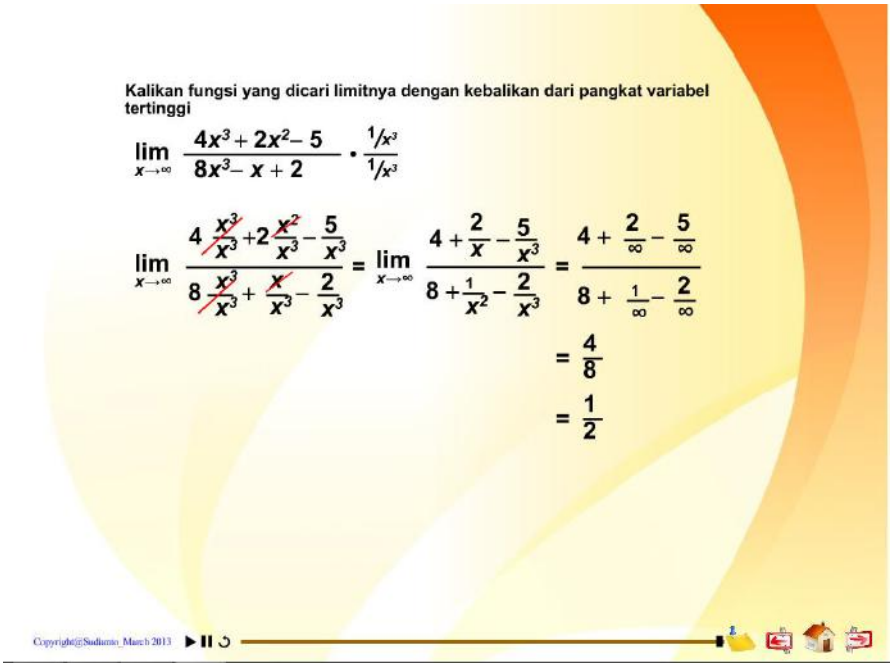

Figure 4.24 The Display of Solution in the Infinite Limit

This page contains an infinite limit solution a fraction form by dividing the highest exponent in the numerator or denominator.

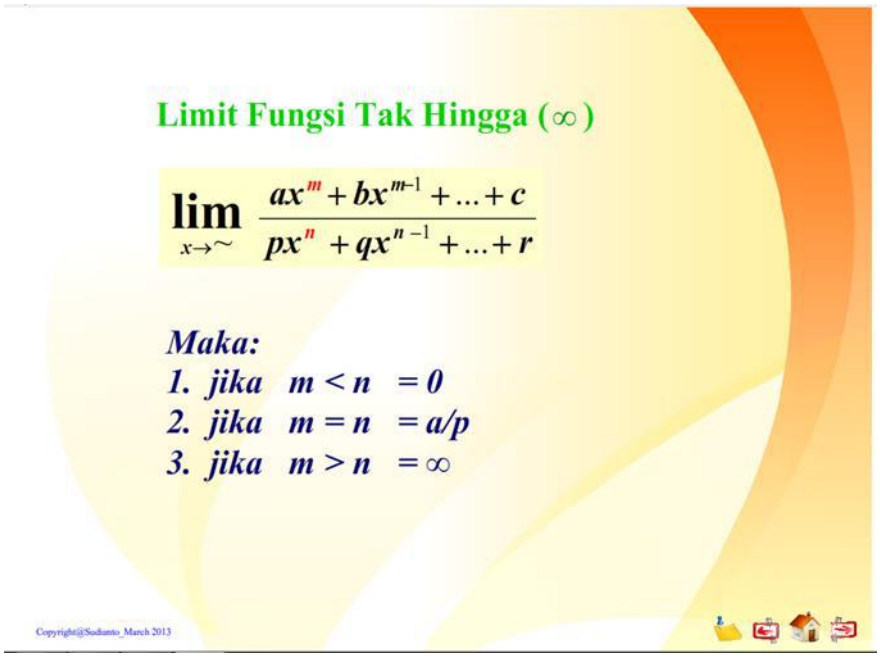

Figure 4.25 The Display of the Infinite Limit in Fractions Form

This page contains the concept of solving the infinite limit in fractions forms by looking at the highest exponent

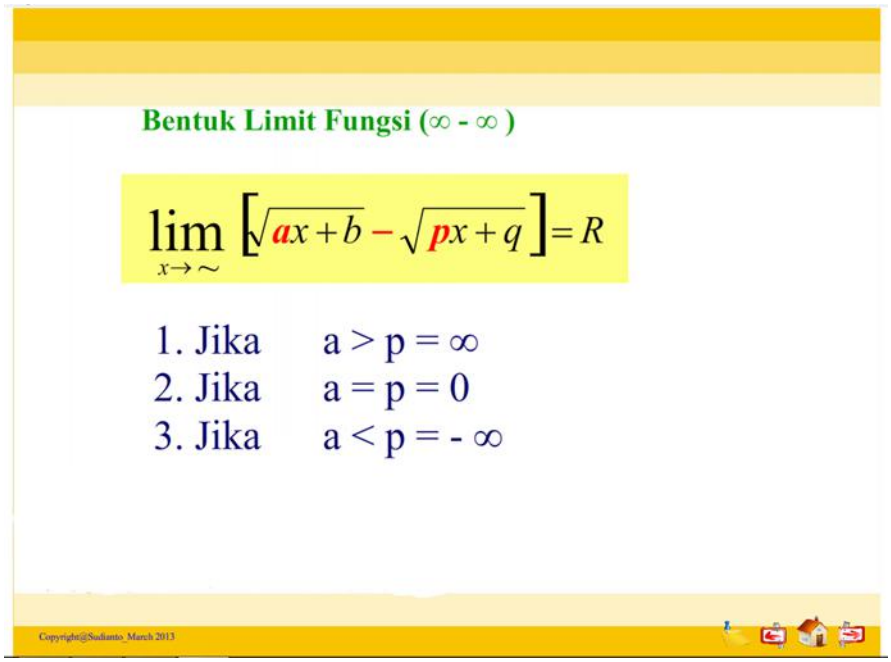

Figure 4.26 The Display of Infinite Limit Conncept

This page contains the concept of solving the infinite limit in root form ∞-∞ using alternative formula.

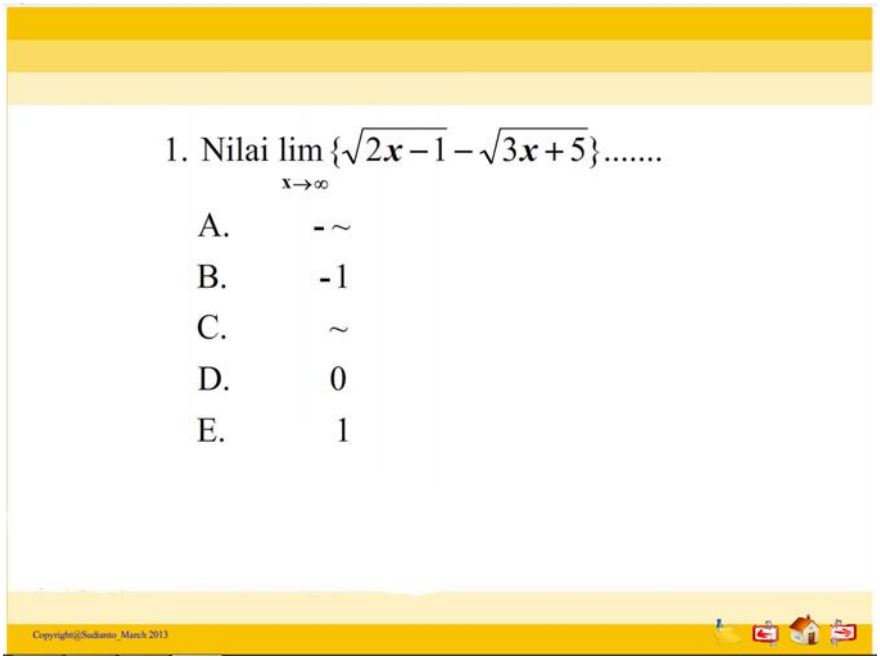

Figure 4.27 The Display of Exercise in the Infinite Limit

This page contains exercise at the infinite limit in root form

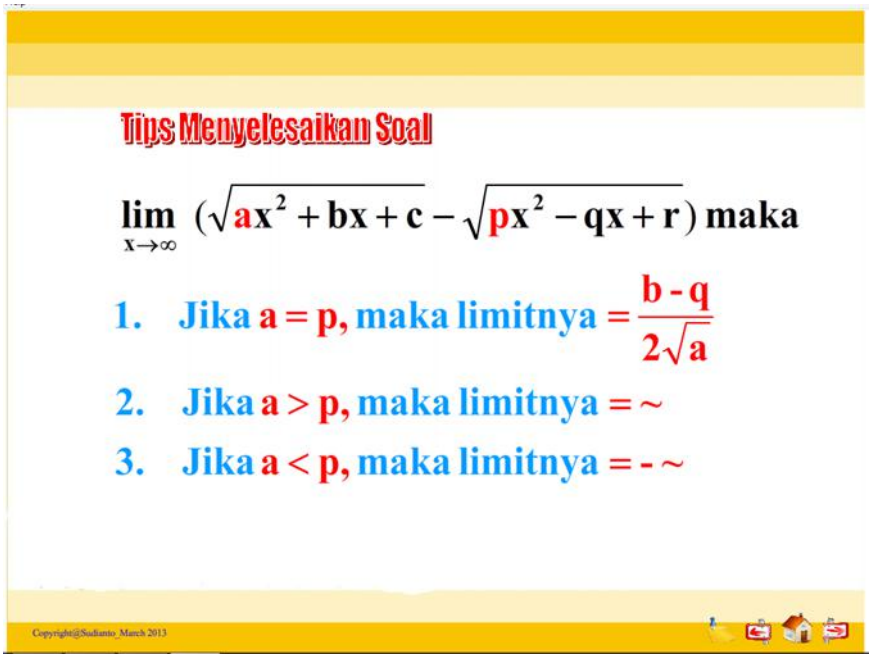

Figure 4.28 The Display of the Infinite Limit Concept in Roots Form

This page contains the concept of solving the infinite limit in root form using alternative formulas.

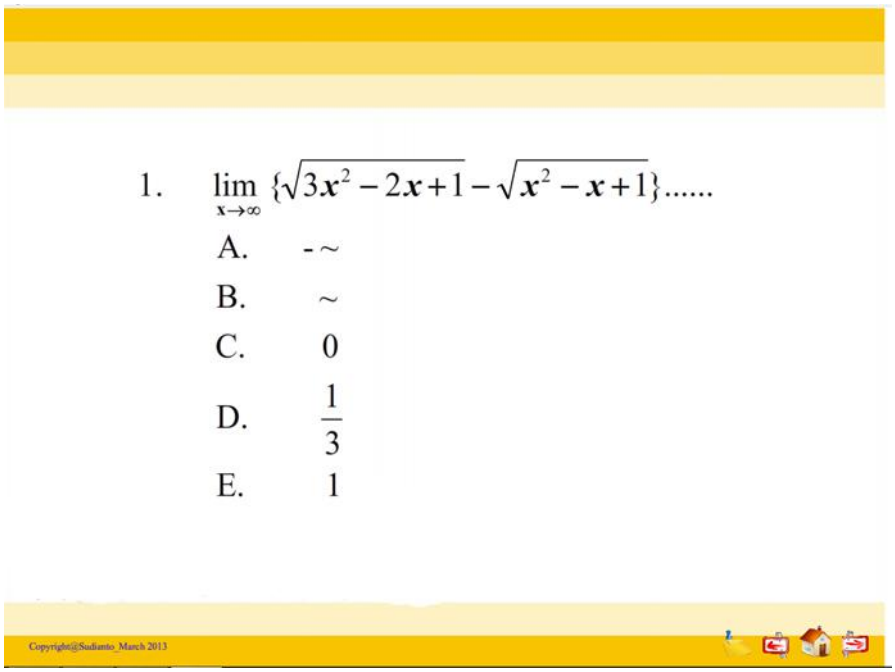

Figure 4.29 The Display of Exercise the Infinite Limit

This page contains exercise and solution the infinite limit in roots form

Figure 4.30 The Display of the Limit of Trigonometric Functions

This page is the initial display at the limit of trigonometric functions

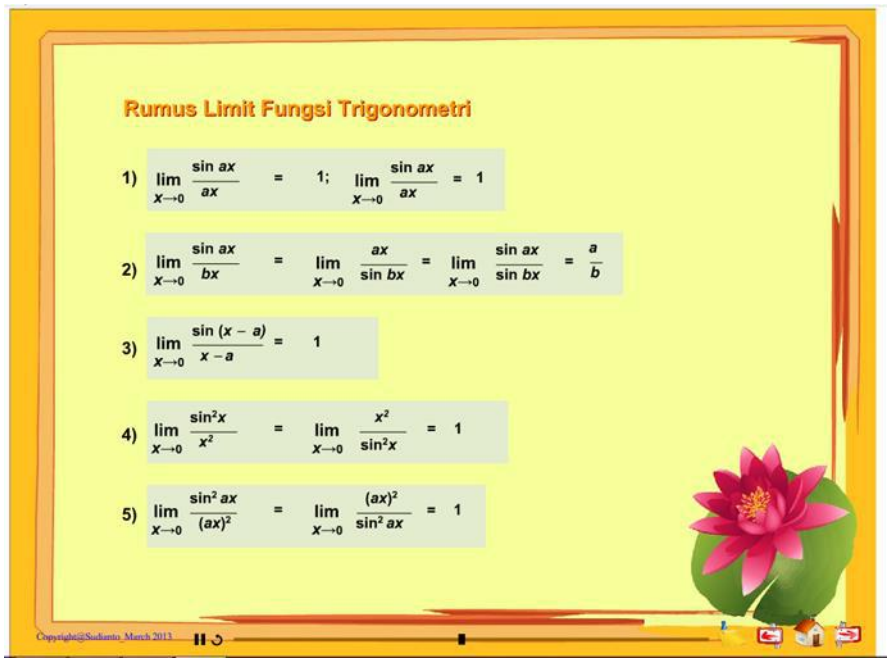

Figure 4.31 The Display of Formula at the Limit of Trigonometric Function

This page contains concepts in solving the limit of trigonometric function.

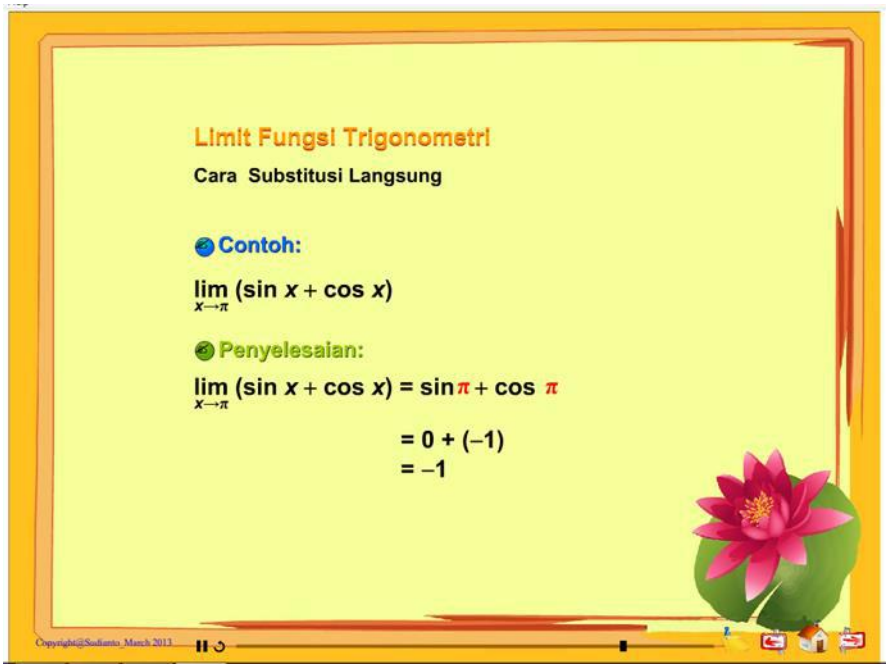

Figure 4.32 The Display of Solution the Limit of Trigonometric Function

This page contains examples of the limits of trigonometric functions.

Figure 4.33 The Display of L'hospital Theorem

This page contains the L'hospital's theorem is solution the limit of function by using the differentiate concept.

Figure 4.34 The Display of the Writer’s Identity Page

This page contains the identity of the researcher's address, date of birth, experience, and so on.

2. The design of Learning Media Using iMindMap

The final result of the design of learning media using iMindMap is an application of learning at the topic of the limit of function. It will can be used in the experimental study in class *XI IPA 4*.

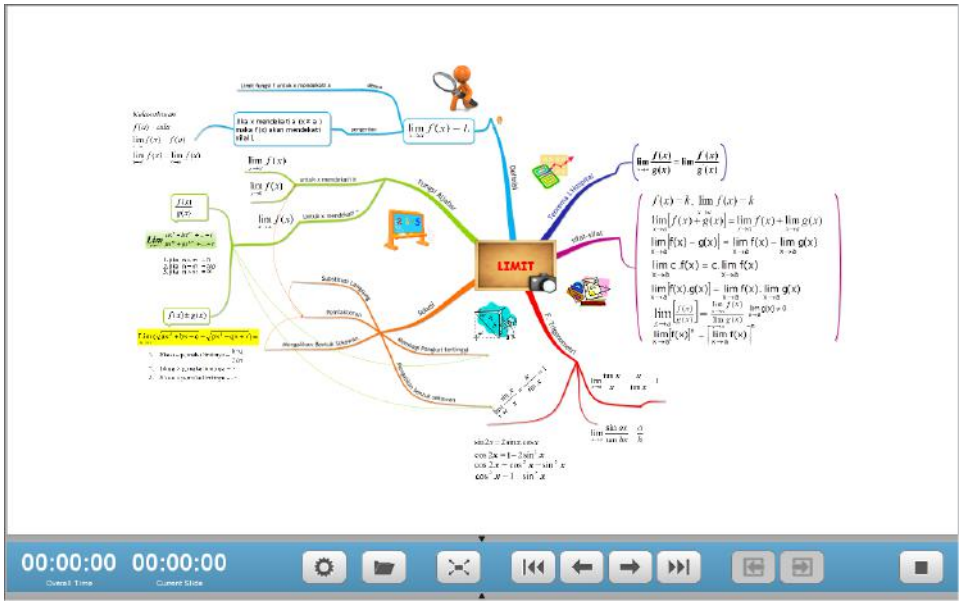

Figure 4.35 The Display Result of Media at the Limit of Functions in 2D

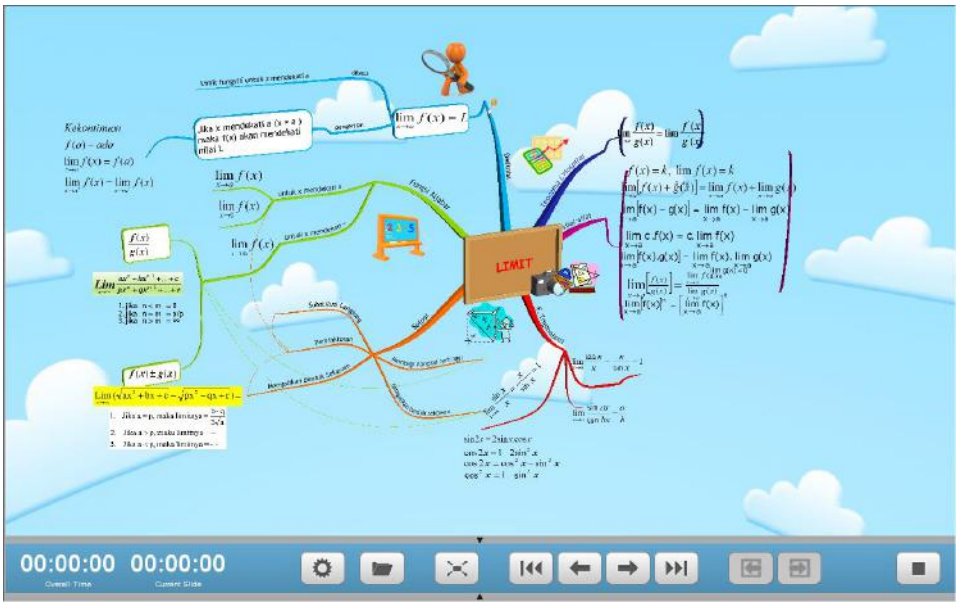

Figure 4.36 : The Display Result of Media at the Limit of Functions in 3D

C. Data Analysis

1. Evaluation Media of Adobe Flash CS3

a. Experts of Material

The data that researcher obtained from two experts who evaluate learning media of Adobe Flash CS3 based on aspects of the content quality, purpose, and aspects of the quality of learning. The results obtained as shown in the following table :

Table 4.3 The Results of Evaluation by Material Experts

No.	Aspects	Percentage	Category
1.	The content quality and purpose	**76.7 %**	Good
2.	The quality of learning	**84 %**	Good

Based on the table 4.3 above, the results of evaluation by material experts, that the content quality and purpose obtained the result of percentage of **76.7 %** are included in a good category. As for the aspect of the quality of learning obtained the results of percentage of **84%** are included into good category. For more calculation results of the evaluation expert can be found in appendix C.3.

b. Experts of Media

The data that researcher obtained from two media experts who evaluate the quality of learning media of Adobe Flash CS3 based on three aspects are software engineering aspect, the design of

learning aspect and visual communication aspect. The results obtained as shown in the following table:

Table 4.4 Results of Evaluation by Media Experts

No.	Aspects	Percentage	Category
1	Software engineering	**90 %**	Very good
2	The design of learning	**91, 4%**	Very good
3	Visual communication	**90 %**	Very good

Based on the table 4.4 above, the results of evaluation by media experts are known that for software engineering aspects obtained the results of percentage of **90%,** is included in a very good category. As for the design of learning aspect is known to obtain results of percentage of **91.4%** is included in a very good category. And aspects of visual communication obtained the results of percentage of **90%** which is included in a very good category. For more calculation the results of media experts in appendix C.3.

2. Evaluation Media of iMindMap

a. Experts of Material

The data that researcher obtained from material expert who evaluate learning media of iMindMap based on aspects of the content quality, purpose. The results obtained as shown in the following table :

Table 4.5 The Results of Evaluation by Material Experts

No.	Aspects	Percentage	Category
1.	The content quality and purpose	**83.3 %**	Good

Based on the table 4.5 above, the results of evaluation by material experts, that the content quality and purpose obtained the result of percentage of **83.3 %** are included in a good category. For more calculation results of the evaluation expert can be found in appendix C.5.

b. Experts of Media

The data that researcher obtained from media expert who evaluate the quality of learning media of iMindMap based on two aspects are software engineering aspect and visual communication aspect. The results obtained as shown in the following table:

Table 4.6 Results of Evaluation by Media Experts

No.	Aspects	Percentage	Category
1	Software engineering	**91.4 %**	Very good
3	Visual communication	**88.5 %**	Very good

Based on the table 4.6 above, the results of evaluation by media experts are known that for software engineering aspects obtained the results of percentage of **91.4%,** is included in a very good category. As for aspects of visual communication obtained the results of percentage of **88.5 %** which is included in a very good

category. For more calculation the results of media experts in appendix C.5.

3. Prerequisites Test

a. Normality Test

Based on calculations of normality test using software IBM SPSS Statistics 19 obtained the results in the following table:

Tabel 4.7 Normality Test by Kolmogorov-Smirnov

		Kolmogorov-Smirnov[a]		
	Media	Statistic	df	Sig.
Nilai Matematika	Adobe Flash CS3	.125	34	.194
	iMindMap	.123	31	.200*

a. Lilliefors Significance Correction

Based on the table above, known that the value of significance (sig.) for the data on the first experiment class using Adobe Flash CS3 at the column *Kolmogorov-Smirnov[a]* is equal to 0.194 at *significant level* of α = 5%. It can be concluded that data at the first experiment class using Adobe Flash CS3 is **normally distributed** because sig. > 0.05, namely 0.194 > 0.05. While the second experiment class using software iMindMap at the column *Kolmogorov-Smirnov[a]* is 0.200 at *significant level* of α = 5%. It can be concluded that data at the second experiment class using iMindMap software is **normally distributed** because sig > 0.05, namely 0.200 > 0.05. For more calculations can be seen in appendix E.3.

b. Homogeneity Test

Based on calculations of homogeneity test using software IBM SPSS staitistics 19 obtained the results in the following table:

Tabel 4.8

Test of Homogeneity of Variances

Pemahaman Matematika

Levene Statistic	df1	df2	Sig.
.158	1	63	.693

Based on the table above, known that the results of Levene statistic to the students' understanding of mathematics at the first experiment class using Adobe Flash CS3 and the second experiment class using iMindMap at *significant level* of $\alpha = 5\%$ is 0.158 and the value of significance (sig.) = 0.693. It can be concluded that data the first and second experimental classes is are **homogeneous** because values of sig. > 0.05, namely 0.693 > 0.05. For more detail can be found in appendix E.4.

4. Hypothesis Testing

Based on calculation of the normality and homogeneity test by using *software IBM SPSS Statistics 19*, known that data at the first experiment class using Adobe Flash CS3 and the second experiment class using iMindMap are normally distributed and homogeneous, then data analysis can be used for the test of hypothesis is the difference test of two independent samples or independent sample t test is used to find out whether or not the mean difference between the two groups of

samples which are not related. If there is a difference, which one is average higher.

Calculations of hypothesis testing using software IBM SPSS Statistcs 19 obtained the results in the following table:

Tabel 4.9

Independent Samples Test

			Pemahaman Matematika	
			Equal variances assumed	Equal variances not assumed
Levene's Test for Equality of Variances	F		.158	
	Sig.		.693	
t-test for Equality of Means	t		2.277	2.271
	df		63	61.680
	Sig. (2-tailed)		.026	.027
	Mean Difference		6.174	6.174
	Std. Error Difference		2.712	2.719
	95% Confidence Interval of the Difference	Lower	.755	.739
		Upper	11.593	11.608

Hypothesis is submitted :

$H_o : \mu_a = \mu_b$

$H_a : \mu_a \neq \mu_b$

Description :

μ_a = Mean score of students at the first experiment class using Adobe Flash CS3

μ_b = Mean score of students at the second experiment class using iMindMap

H_o = There is no difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap in learning.

H_a = There is a difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap in learning.

Based on the table above, known that the value of t_{count} at 0.05 significant level is equal to 2.277, and the value of sig. by 0.693. While the value of t_{table} at *significant level* α = 5% and 63 degrees of freedom obtained through the program Microsoft Excel 2010 by typing = tinv (0.05, 63) on an empty cell and then enter obtained t_{table} = 1.998. Thus the value of $t_{count} > t_{table}$, namely 2.277 > 1.998, then Ho is rejected. The conclusion that there is a significant difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap at the topic of the limit of function.

D. Discussion

The process of research was implemented for about 2 months in *SMAN 5 Kota Cirebon* at science eleventh class in the second semester of academic year 2012/2013. This research took two experiment classes with different treatments. The first experimental class using Adobe Flash CS3 in learning, while The second experiment class using iMindMap in learning. then the researcher analyzed the differences in the two experiment classes using independent samples t test with the help of software IBM SPSS Statistics 19.

Based on the observations of researcher at the process of learning in classroom using Adobe Flash CS3, students were more responsive in receiving the material was delivered by the teacher. The students were also many who asked if they found difficulty in answering questions. This showed that the class using Adobe Flash CS3 was more active in the learning process at the class. By using animation was also easier for students to understand the material and sample questions were delivered by teacher, so that learning activities was more easily understood and to increase the students' understanding of mathematics at the topic of the limit of function. So was the learning that used iMindMap, students knew the overall picture of the material would be delivered using mind mapping.

Based on data from the students' understanding of mathematics at the first experiment class using Adobe Flash CS3 obtained mean of 67.21. The mean of mathematics understanding included in a good categories. While the

students' understanding of mathematics at the second experiment class using iMindMap software obtained mean of 61.03. The mean of mathematics understanding is classified in an enaough category.

Based on calculations of the hypothesis testing using the difference test of two independent samples is known that there is a difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap. The difference is seen from the mean difference on SPSS of 6.174 is a mean difference between the first experiment that use Adobe Flash CS3 and the second experiment that use iMindMap, the difference is one of them due to the different treatments in both classes.

Based on calculations of the hypothesis testing using the difference test of two independent samples is known that $t_{count} > t_{table}$, namely 2.277 > 1.998, then Ho is rejected. This showed that there is significant difference between the use of Adobe Flash CS3 and iMindMap in learning. This statement is accordance with the earlier statement that there is a difference between the students' understanding of mathematics by using Adobe Flash CS3 and iMindMap.

This is consistent with the results of research that is conducted by Asep Heriyanto, Student Mathematics Education Department of Tarbiyah Faculty of IAIN Syekh Nurjati Cirebon, He said that there is the difference between the students' achievement by using macromedia flash 8 and three-dimensional objects kit, by value of $t_{table} > t_{count}$, namely 3.902 > 1.99. This showed that the students' learning outcomes using Macromedia Flash 8 is higher than using three-dimensional objects kit.

CHAPTER V
CLOSING

A. Conclusion

Based on the results of analysis data and hypothesis testing that have been described, then can be concluded by as follow:

1. The results of data research are obtained by researcher is known that the students' understanding of mathematics in experimental class by using Adobe Flash CS3 with the highest score of 91 and the low score of 52. The mean value obtained for the experimental class of 67.21, with a standard deviation value of 10.642. The values belong to the good category
2. The results of data research are obtained by researcher is known that the students' understanding of mathematics in experimental class by using iMindMap with the highest score of 82 and the low score of 41. The mean value obtained for the experimental class of 60.03, with a standard deviation value of 11.217. The values belong to the enough category.
3. The results of analysis data using Independent sample T-test is known that t_{count} 2.277. While the value t_{table} with a confidence interval = 95% (0.05 significance level) and degree of freedom of 63 is 1.998. Thus the value of $t_{count} > t_{table,}$ namely 2.277 > 1.998 then H_o is rejected, meaning that there is the difference between students' understanding of mathematics in class by using Adobe Flash CS3 and the class using the learning media of iMindMap at the topic of the limit of function.

B. Suggestion

1. The environmental condition, psychological each individual have a factors that influence the way a person to learn. Therefore, as educators should have to know the situations and abilities of the students. An educators must be also able to create a varies learning atmosphere, so learning is more fun and not monotonous. One of them is the use of computer-based learning media using Adobe Flash CS3 or iMindMap in learning.
2. The use of Adobe Flash CS3 to be an alternative media to enhance the students's understanding of mathematics due to it can be designed in accordance with the objectives and content of the material learning will be delivered either through animations, images, and sound.
3. In this research, the researcher only analyzed the differences in the students' understanding of learning mathematics by using Adobe Flash CS3 and iMindMap at the topic of the limit of function. Further research is expected to be deeper and not limited to understanding variables and more varied in using other learning software.

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APPENDIXS

APPENDIX A

Instrument Test

A.1. List of Students' Names of Instruments Test
A.2. List of Students' Names in Experiment Class 1st
A.3. List of Students' Names in Experiment Class 2nd
A.4. Lattice Instrument Test
A.5. The Trial of Mathematics Understanding Test
A.6. Answer Key and Value Score

Appendix A.1 List of Students' Names of Instruments Test

DAFTAR PESERTA UJI COBA INSTRUMEN
KELAS XI IPA 2 SMA NEGERI 5 KOTA CIREBON

NO	INDUK	KODE SISWA	NAMA SISWA	P/L	SKOR
1	111210002	U-01	AJENG PUSPA BUANA	P	52
2	111210003	U-02	AKHMAD MUZADI	L	36
3	111210294	U-03	ANDRE SEMA RESTU HUTAMA	L	42
4	111210042	U-04	ASTRI ENDAH SARTIKASARI	P	47
5	111210081	U-05	AULIA RAHMAN SIMBOLON	P	72
6	111210193	U-06	AYU RIANINGSIH KHODIFA	P	47
7	111210262	U-07	DIMAS CATUR WIBHI LAKSONO	L	72
8	111210302	U-08	DWI NUGROHO	L	41
9	111210159	U-09	EKA FITRIANI	P	61
10	111210229	U-10	ERLIN AGUSTIN	P	91
11	111210264	U-11	ERLINDA SAFITRY	P	41
12	111210089	U-12	FAKIH JAMALUDIN	L	33
13	111210012	U-13	GIAR SYAMSU PERDANA	L	79
14	111210050	U-14	GITA RIZKY NABILAH	P	41
15	111210053	U-15	INGGIT NUR SHOLEHA	P	73
16	111210130	U-16	IRENA TIARA KUSUMAH	P	37
17	111210054	U-17	IRFAN SETIYADI	L	42
18	111210094	U-18	IRMA KUSUMA RAHAYU	P	58
19	111210165	U-19	ISYE SUSILAWATI	P	62
20	111210017	U-20	JUWITA MAULYDATIN	P	51
21	111210312	U-21	NAUFAL AIMAN	L	43
22	111210026	U-22	NU NU AMALIA	P	51
23	111210241	U-23	NURHAYATI	P	56
24	111210277	U-24	NURUL AISYAH	P	72
25	111210243	U-25	PUTRI OKTALIA	P	57
26	111210068	U-26	RENU ALVIAN	L	42
27	111210106	U-27	RESTU AGUNG SETIADI	L	38
28	111210217	U-28	SEPTIYANTI	P	47
29	111210033	U-29	SITI NURKHORIAH	P	45
30	111210248	U-30	SRI WULAN	P	90
31	111210146	U-31	STEPHEN ALEXANDER HARTOMO	L	64
32	111210288	U-32	SUCI HERYANI	P	42
33	111210113	U-33	WAHYU BUDIMAN	L	74
34	111210327	U-34	WIDIA ASTUTI	P	42
35	111210187	U-35	YULIE NURBAETI	P	60

Appendix A.2 List of Students' Names in Experiment Class 1st

DAFTAR NAMA SISWA KELAS EKSPERIMEN 1
KELAS XI IPA 3 SMA NEGERI 5 KOTA CIREBON

NO	INDUK	KODE SISWA	NAMA SISWA	P/L	SKOR
1	111210001	S-01	ADAM HERMAWAN	L	68
2	111210295	S-02	ANI KARLINA	P	91
3	111210005	S-03	ASRI INDAH FATIMAH	P	79
4	111210154	S-04	AYU ANJANI	P	65
5	111210006	S-05	CHIKA WINANDHA	P	80
6	111210007	S-06	DANI DWINUR SAPUTRA	L	67
7	111210226	S-07	DEVI OKTAPIYANI	P	67
8	111210227	S-08	DEWI SEKARINI	P	67
9	111210122	S-09	DIAN YUNIASIH	P	72
10	111210085	S-10	DICKA RESTU AYU	P	57
11	111210265	S-11	FANI TIARANI PRATIWI	P	66
12	111210090	S-12	FEBRI FITRI YANTI	P	52
13	111210161	S-13	FEBY MEIDIYANTI	P	52
14	111210199	S-14	FHAD AR RIDJAL	L	77
15	111210230	S-15	FITRI RAHMADHANTI	P	76
16	111210013	S-16	GINA TRI PUSPA HUBADA	P	65
17	111210091	S-17	GUY PARADIBA	P	65
18	111210051	S-18	HAFID SUNANDAR	L	70
19	111210306	S-19	IKA AYU WAKIAH NURJATI	P	70
20	111210055	S-20	JOHAN HARI LISMANA	L	58
21	111210095	S-21	JUJU IISRIYANTO	P	54
22	111210166	S-22	KRISNA WAHYU KUSUMA AJI	L	63
23	111210132	S-23	LARAS DWI ASTUTI	P	88
24	111210018	S-24	MEILIA HERTATIYANI	P	79
25	111210313	S-25	NONI PUTU INANOSA	P	56
26	111210064	S-26	NUANSA BANYU SEGARA	L	62
27	111210065	S-27	NUR EKA SRI AZIZAH	P	57
28	111210069	S-28	RESTI MUSTIKA	P	66
29	111210109	S-29	RIZKY AMELIA	P	78
30	111210250	S-30	SYARIF RAMDHANI	L	59
31	111210289	S-31	TANG WIN	L	59
32	111210220	S-32	TRISNO ADI SAPUTRA	L	60
33	111210114	S-33	YESSI PARAMITA CITRADEWI	P	52
34	111210188	S-34	YULINAR KHOIRUNNISA	P	88

Appendix A.3 List of Students' Names In Experiment Class 2nd

DAFTAR NAMA SISWA KELAS EKSPERIMEN 2
KELAS XI IPA 4 SMA NEGERI 5 KOTA CIREBON

NO	INDUK	KODE SISWA	NAMA SISWA	P/L	SKOR
1	111210040	S-01	AJIZAH	P	64
2	111210078	S-02	ALFI QOMARIYAH	P	74
3	111210116	S-03	AMELIA RAMADHINI	P	42
4	111210189	S-04	AMSOR CHAIRUDDIN	L	82
5	111210118	S-05	AVINY TRIYANA	P	74
6	111210297	S-06	BELLA MARETA ARINKA	P	61
7	111210155	S-07	DESSY PURNAMASARI	P	54
8	111210123	S-08	DINA FAIZAH HANA	P	58
9	111210086	S-09	DINIATY KUSUMA DEWI	P	41
10	111210047	S-10	DITA AMELIA NINGSIH	P	61
11	111210052	S-11	HERLIANI	P	53
12	111210163	S-12	HERLIYANA	P	67
13	111210201	S-13	ICHA CRISTIAN	P	55
14	111210015	S-14	INTAN NURZANAH	P	58
15	111210308	S-15	IRFAN SISWANTO	L	58
16	111210096	S-16	LALA SAKUNTALA	P	53
17	111210272	S-17	MARIA ULFAH	P	52
18	111210057	S-18	MOHAMAD SANDY PAMUNGKAS	L	67
19	111210134	S-19	MOHAMAD ARIEF SUYUDI	L	71
20	111210022	S-20	MUHAMMAD RIZKA ANUGRAH	L	76
21	111210171	S-21	NADYA AMALIA	P	44
22	111210066	S-22	NURFAIZI RAHADIANSYAH	L	48
23	111210028	S-23	RAVIN MIZIA RAYEOK	L	78
24	111210283	S-24	RISKA KHAIRUNNISA	P	58
25	111210321	S-25	RITA KARTIKA SARI	P	61
26	111210286	S-26	SENDY PERMANA	L	77
27	111210110	S-27	SITI WULANDARI	P	80
28	111210325	S-28	TAUFIK IMAM PRAMONO	L	62
29	111210290	S-29	TRIANA	P	54
30	111210254	S-30	VERA FATIMAH MUHARINA	P	54
31	111210221	S-31	VINNA HADISYAHPUTRI	P	55

Appendix A.4 Lattice Instrument Test

KISI-KISI SOAL TES PEMAHAMAN

The Comparative Study Between The Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function

(Experimental Study at Science Eleventh Class of *SMAN 5 Kota Cirebon*)

Variabel	Materi Pokok	Indikator Pemahaman	Nomor Soal	Jenis Pemahaman
Pemahaman Matematika	Limit Fungsi	Menghitung limit fungsi aljabar di satu titik bentuk $\lim_{x \to a} f(x)$ dengan menggunakan cara subtitusi	1 , 2	Komputasional
		Menghitung limit fungsi aljabar di satu titik bentuk $\lim_{x \to a} f(x)$ dengan menggunakan cara faktorisasi	3, 4	Komputasional
			5, 6	Fungsional
		Menentukan limit fungsi aljabar di satu titik dan tak hingga bentuk $\lim_{x \to a} f(x)$ dan $\lim_{x \to \infty} f(x)$ dengan perkalian bentuk sekawannya.	7, 8, 9	Fungsional

		Menentukan limit fungsi aljabar di titik tak hingga bentuk $\lim_{x\to\infty}\frac{f(x)}{g(x)}$ dengan membagi pangkat tertinggi	10	Komputasional
		Menentukan limit fungsi aljabar di titik tak hingga bentuk $\lim_{x\to\infty}\sqrt{f(x)}-\sqrt{g(x)}$ dengan perkalian bentuk sekawannya dan membagi pangkat tertinggi	11, 12	Fungsional
		Menghitung limit fungsi Trigonometri di satu titik	13	Komputasional
			14, 15	Fungsional
		Menerapkan sifat-sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri	1-15	Komputasional dan Fungsional

Appendix A.5 The Trial of Mathematics Understanding Test

UJI COBA TES PEMAHAMAN MATEMATIKA

Mata Pelajaran	: Matematika
Pokok Bahasan	: Limit Fungsi
Kelas/ Semester	: XI IPA/ Genap
Waktu	: 90 menit

Petunjuk :

- Banyaknya soal 15 butir essay
- Berdoalah terlebih dahulu sebelum anda mengerjakan soal
- Tulislah nama, kelas dan nomor induk siswa pada lembar jawaban yang tersedia
- Kerjakan semua soal dengan teliti pada lembar jawaban yang tersedia
- Laporkan dan tanyakan kepada pengawas bila terdapat hal-hal yang tidak jelas
- Periksa kembali pekerjaan anda sebelum diserahkan kepada pengawas.

1. Hitunglah nilai $\lim_{x \to 3} \left[(x^2 + 3)(2x - 1) \right]$ =……

2. Nilai dari $\lim_{x \to -1} \frac{x^5 - x^3 - x}{x^4 - x^3}$ =……

3. Hitunglah nilai $\lim_{x \to 6} \frac{x^2 - 4x - 12}{x - 6}$ =……

4. Tentukan nilai $\lim_{x \to 2} \frac{3x^2 - 8x + 4}{x^2 + 2x - 8}$ =…….

5. Tentukan nilai $\lim_{x \to 1} \frac{4x^4 - 4x}{x - 1}$ =……

6. Hitunglah nilai $\lim_{x \to 2} \frac{2}{x^2 - 4} - \frac{3}{x^2 + 2x - 8}$ =……..

7. Nilai dari $\lim_{x \to 4} \frac{x-4}{\sqrt{x^2-16}}$ =……..

8. Nilai dari $\lim_{x \to 3} \frac{x^2-9}{\sqrt{x^2+16}-5}$ =…….

9. Tentukan nilai $\lim_{x \to 5} \frac{x^2-3x-10}{5-\sqrt{4x+5}}$ =……

10. Hitunglah nilai $\lim_{x \to \infty} \frac{(2x-1)^3}{4x^3-x+1}$ =……

11. Nilai dari $\lim_{x \to \infty} \sqrt{4x+8}-\sqrt{4x-3}$ =……..

12. Nilai dari $\lim_{x \to \infty} \sqrt{(2x-5)(2x+1)}-(2x-5)$ =……

13. Hitunglah nilai $\lim_{x \to 0} \frac{\sin 5x}{\tan 3x}$ =……

14. Tentukan nilai $\lim_{x \to 0} \frac{1-\cos 2x}{x.\tan(\frac{1}{2}x)}$ =……..

15. Tentukan nilai $\lim_{x \to 0} \frac{\tan 3x-\tan 3x.\cos 2x}{4x^3}$ =……

Selamat mengerjakan semoga sukses……!!!

Appendix A.6 Answer Key and Value Score

KUNCI JAWABAN DAN SKOR NILAI

NO	URAIAN JAWABAN	SKOR
1	**SOAL 1** $= \lim_{x \to 3}[(x^2 + 3)(2x - 1)]$ $= [(3^2 + 3)(2.3 - 1)]$ $= (12)(5)$ $= 60$	 2 2 2
	Maksimum Skor	**6**
2	**SOAL 2** $= \lim_{x \to -1} \frac{x^5 - x^3 - x}{x^4 - x^3}$ $= \frac{(-1)^5 - (-1)^3 - (-1)}{(-1)^4 - (-1)^3}$ $= \frac{-1+1+1}{1+1}$ $= \frac{1}{2}$	 2 2 2
	Maksimum Skor	**6**
3	**SOAL 3** $= \lim_{x \to 6} \frac{x^2 - 4x - 12}{x - 6}$ $= \lim_{x \to 6} \frac{(x+2)(x-6)}{(x-6)}$ $= \lim_{x \to 6} (x+2)$ $= (6+2)$ $= 8$	 2 2 2
	Maksimum Skor	**6**

4	**SOAL 4** $= \lim_{x \to 2} \frac{3x^2 - 8x + 4}{x^2 + 2x - 8}$ $= \lim_{x \to 2} \frac{(3x - 2)(x - 2)}{(x - 2)(x + 4)}$ $= \lim_{x \to 2} \frac{(3x - 2)}{(x + 4)}$ $= \frac{3(2) - 2}{(2) + 4}$ $= \frac{4}{6} = \frac{2}{3}$	 2 2 1 1
	Maksimum Skor	**6**
5	**SOAL 5** $= \lim_{x \to 1} \frac{4x^4 - 4x}{x - 1}$ $= \lim_{x \to 1} \frac{4x(x^3 - 1)}{(x - 1)}$ $= \lim_{x \to 1} \frac{4x(x - 1)(x^2 + x + 1)}{(x - 1)}$ $= \lim_{x \to 1} 4x(x^2 + x + 1)$ $= 4(1)[(1)^2 + 1 + 1]$ $= 4(3)$ $= 12$	 2 2 1 1
	Maksimum Skor	**6**

6	**SOAL 6**	
	$= \lim_{x \to 2} \frac{2}{x^2 - 4} - \frac{3}{x^2 + 2x - 8}$	
	$= \lim_{x \to 2} \frac{2(x+4) - 3(x+2)}{(x-2)(x+2)(x+4)}$	2
	$= \lim_{x \to 2} \frac{2x + 8 - 3x - 6}{(x-2)(x+2)(x+4)}$	1
	$= \lim_{x \to 2} \frac{-x + 2}{(x-2)(x+2)(x+4)}$	1
	$= \lim_{x \to 2} \frac{-(x-2)}{(x-2)(x+2)(x+4)}$	1
	$= \lim_{x \to 2} \frac{-1}{(x+2)(x+4)}$	1
	$= \frac{-1}{(2+2)(2+4)}$	1
	$= \frac{-1}{24}$	1
	Skor Maksimum	**8**
7	**SOAL 7**	
	$= \lim_{x \to 4} \frac{x-4}{\sqrt{x^2 - 16}} \cdot \frac{\sqrt{x^2 - 16}}{\sqrt{x^2 - 16}}$	1
	$= \lim_{x \to 4} \frac{(x-4)\sqrt{x^2 - 16}}{(x^2 - 16)}$	1
	$= \lim_{x \to 4} \frac{(x-4)\sqrt{x^2 - 16}}{(x+4)(x-4)}$	1
	$= \lim_{x \to 4} \frac{\sqrt{x^2 - 16}}{(x+4)}$	1
	$= \frac{\sqrt{16 - 16}}{(4+4)}$	1
	$= \frac{0}{8} = 0$	1

	Maksimum Skor	**6**
8	**SOAL 8**	
	$= \lim_{x \to 3} \frac{x^2 - 9}{\sqrt{x^2 + 16} - 5} \cdot \frac{\sqrt{x^2 + 16} + 5}{\sqrt{x^2 + 16} + 5}$	1
	$= \lim_{x \to 3} \frac{(x^2 - 9)(\sqrt{x^2 + 16} + 5)}{(x^2 + 16) - 25}$	1
	$= \lim_{x \to 3} \frac{(x^2 - 9)(\sqrt{x^2 + 16} + 5)}{(x^2 - 9)}$	1
	$= \lim_{x \to 3} \sqrt{x^2 + 16} + 5$	1
	$= \sqrt{9 + 16} + 5$	1
	$= 10$	1
	Maksimum Skor	**6**
9	**SOAL 9**	
	$= \lim_{x \to 5} \frac{x^2 - 3x - 10}{5 - \sqrt{4x + 5}} \cdot \frac{5 + \sqrt{4x + 5}}{5 + \sqrt{4x + 5}}$	1
	$= \lim_{x \to 5} \frac{(x^2 - 3x - 10)(5 + \sqrt{4x + 5})}{25 - (4x + 5)}$	1
	$= \lim_{x \to 5} \frac{(x + 2)(x - 5)(\sqrt{4x + 5} + 5)}{-4x + 20}$	1
	$= \lim_{x \to 5} \frac{(x + 2)(x - 5)(\sqrt{4x + 5} + 5)}{-4(x - 5)}$	1
	$= \lim_{x \to 5} \frac{(x + 2)(\sqrt{4x + 5} + 5)}{-4}$	1
	$= \frac{(5 + 2)(\sqrt{25} + 5)}{-4}$	1
	$= \frac{(7)(5 + 5)}{-4}$	1
	$= -\frac{35}{2}$	1

	Maksimum Skor	**8**
10	**SOAL 10** $= \lim_{x\to\infty} \frac{(2x-1)^3}{4x^3-x+1}$ $= \lim_{x\to\infty} \frac{(4x^2-4x+1)(2x-1)}{4x^3-x+1}$ $= \lim_{x\to\infty} \frac{8x^3-12x^2+6x-1}{4x^3-x+1}$ $= \frac{8\frac{x^3}{x^3}-\frac{12x^2}{x^3}+\frac{6x}{x^3}-\frac{1}{x^3}}{4\frac{x^3}{x^3}-\frac{x}{x^3}+\frac{1}{x^3}}$ $= \frac{8-0+0-0}{4-0+0}$ $= 2$	1 2 2 1
	Maksimum Skor	**6**

11	**SOAL 11**	
	$= \lim_{x\to\infty} \sqrt{4x+8} - \sqrt{4x-3}$	
	$= \lim_{x\to\infty} \sqrt{4x+8} - \sqrt{4x-3} \ x \frac{\sqrt{4x+8} + \sqrt{4x-3}}{\sqrt{4x+8} + \sqrt{4x-3}}$	1
	$= \lim_{x\to\infty} \frac{(4x+8)-(4x-3)}{\sqrt{4x+8} + \sqrt{4x-3}}$	1
	$= \lim_{x\to\infty} \frac{11}{\sqrt{4x+8} + \sqrt{4x-3}}$	1
	$= \lim_{x\to\infty} \frac{\frac{11}{\sqrt{x}}}{\sqrt{\frac{4x}{x} + \frac{8}{x}} + \sqrt{\frac{4x}{x} - \frac{3}{x}}}$	1
	$= \frac{0}{\sqrt{4+0} + \sqrt{4-0}}$	1
	$= \frac{0}{4} = 0$	1
	Maksimum Skor	**6**

12	**SOAL 12**	
	$= \lim_{x \to \infty} \sqrt{(2x-5)(2x+1)} - (2x-5)$	
	$= \lim_{x \to \infty} \sqrt{(4x^2-8x-5)} - (2x-5)\ x \dfrac{\sqrt{(4x^2-8x-5)} + (2x-5)}{\sqrt{(4x^2-8x-5)} + (2x-5)}$	1
	$= \lim_{x \to \infty} \dfrac{(4x^2-8x-5) - (2x-5)^2}{\sqrt{(4x^2-8x-5)} + (2x-5)}$	1
	$= \lim_{x \to \infty} \dfrac{(4x^2-8x-5) - (4x^2-20x+25)}{\sqrt{(4x^2-8x-5)} + (2x-5)}$	1
	$= \lim_{x \to \infty} \dfrac{12x-30}{\sqrt{(4x^2-8x-5)} + (2x-5)}$	1
	$= \lim_{x \to \infty} \dfrac{\frac{12x}{x} - \frac{30}{x}}{\sqrt{(\frac{4x^2}{x^2} - \frac{8x}{x^2} - \frac{5}{x^2})} + (\frac{2x}{x} - \frac{5}{x})}$	2
	$= \dfrac{12-0}{\sqrt{4-0-0}+(2-0)}$	1
	$= \dfrac{12}{4} = 3$	1
	Maksimum Skor	**8**
13	**SOAL 13**	
	$= \lim_{x \to 0} \dfrac{\sin 5x}{\tan 3x}$	
	$= \lim_{x \to 0} \dfrac{\sin 5x}{5x}.5x \dfrac{3x}{\tan 3x}.\dfrac{1}{3x}$	2
	$= 1.\ 5x.\ 1.\dfrac{1}{3x}$	2
	$= \dfrac{5}{3}$	2
	Skor Maksimum	**6**

14	**SOAL 14**	
	$= \lim_{x\to 0} \dfrac{1-\cos 2x}{x\tan(\frac{1}{2}x)}$	
	$== \lim_{x\to 0} \dfrac{1-(1-2\sin^2 x)}{x\tan(\frac{1}{2}x)}$	1
	$= \lim_{x\to 0} \dfrac{2\sin^2 x}{x\tan(\frac{1}{2}x)}$	1
	$= 2\lim_{x\to 0} \dfrac{\sin^2 x}{x\tan(\frac{1}{2}x)}$	1
	$= 2\lim_{x\to 0} \dfrac{\sin^2 x}{x^2}.x\dfrac{\frac{1}{2}x}{\tan(\frac{1}{2}x)}.\dfrac{1}{\frac{1}{2}x}$	2
	$= 2[1.x.1.\dfrac{2}{x}]$	2
	$= 4$	1
	Skor Maksimum	**8**

15	**SOAL 15** $= \lim_{x \to 0} \frac{\tan 3x - \tan 3x.\cos 2x}{4x^3}$ $= \lim_{x \to 0} \frac{\tan 3x[1-\cos 2x]}{4x^3}$ $= \lim_{x \to 0} \frac{\tan 3x[1-(1-2\sin^2 x)]}{4x^3}$ $= \lim_{x \to 0} \frac{\tan 3x[2\sin^2 x]}{4x^3}$ $= 2\lim_{x \to 0} \frac{\tan 3x \sin^2 x}{4x^3}$ $= 2\lim_{x \to 0} \frac{\tan 3x}{3x}.3x\frac{\sin^2 x}{x^2}.\frac{1}{4x}$ $= 2[1.3x.1.\frac{1}{4x}]$ $= \frac{3}{2}$	 1 1 1 1 2 1 1
	Maksimum Skor	**8**
	SKOR TOTAL	***100***

NILAI = ……

APPENDIX B

Mathematics Learning Administration

B.1. Learning Syllabus

B.2. Lesson Plan for The Experiment Class 1st

B.3. Lesson Plan for The Experiment Class 2nd

Appendix B.1 Learning Syllabus

SILABUS PEMBELAJARAN

Nama Sekolah : SMA Negeri 5 Cirebon
Mata Pelajaran : MATEMATIKA
Kelas / Program : XI / IPA
Semester : GENAP

STANDAR KOMPETENSI:

6. Menggunakan konsep limit fungsi dan turunan fungsi dalam pemecahan masalah.

Kompetensi Dasar	Materi Ajar	Nilai Budaya Dan Karakter Bangsa	Kewirausahaan/ Ekonomi Kreatif	Kegiatan Pembelajaran	Indikator Pencapaian Kompetensi	Penilaian			Alokasi Waktu (menit)	Sumber/Bahan /Alat
						Teknik	Bentuk Instrumen	Contoh Instrumen		
6.1. Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi	Limit fungsi • Limit fungsi aljabar: - Definisi limit secara intiutif. - Definisi limit	❸ Rasa ingin tahu ❸ Mandiri ❸ Kreatif ❸ Kerja keras	❸ Berorientasi tugas dan hasil ❸ Percaya diri ❸ Keorisinilan	• Menjelaskan arti limit fungsi secara intiutif berdasarkan fungsi aljabar yang sederhana. • Menjelaskan arti limit fungsi secara aljabar berdasarkan	• Menghitung limit fungsi aljabar di suatu titik dan tak hingga.	Tugas individu	Uraian singkat.	Tentukan limit fungsi-fungsi berikut ini: a. $\lim_{x\to 1}\left(2x^2-3\right)$ b. $\lim_{x\to 1}\frac{\left(x^2+3x-4\right)}{x-1}$	4 × 45 menit.	Sumber: • Buku paket (Seribu pena Matematika untuk SMA/ MA kelas XI, karangan Husein Tampomas) hal. 303-341.

aljabar dan trigonometri.	secara aljabar. - Limit fungsi-fungsi berbentuk $\lim_{x\to c} f(x)$ (cara substitusi, faktorisasi, dan perkalian sekawan). - Limit fungsi di tak hingga			fungsi aljabar sederhana. • Menghitung limit fungsi aljabar di suatu titik menggunakan cara substitusi, faktorisasi, dan perkalian dengan sekawan. • Menghitung limit fungsi aljabar di tak hingga .				c. $\lim_{x\to\infty} x+\sqrt{x^2-4}$		• Buku referensi lain. Alat: • Laptop • LCD • OHP
	• Teorema-teorema limit : - Menggunakan teorema limit untuk menghitung limit fungsi aljabar dan trigonometri.			• Memahami teorema-teorema limit dalam perhitungan limit fungsi. • Menjelaskan teorema-teorema limit yang digunakan dalam perhitungan limit. • Menggunakan teorema limit dalam menghitung	• Menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar.	Tugas individu.	Uraian singkat.	Tentukan limit fungsi-fungsi berikut ini: a. $\lim_{x\to 3}\left(2x^2-3x+1\right)$ b. $\lim_{x\to 1}\frac{\left(x^2+3x-4\right)}{x-1}$ c. $\lim_{x\to\infty}\sqrt{x+3}+\sqrt{x-6}$	2 × 45 menit.	Sumber: • Buku paket hal. 118-124. • Buku referensi lain. Alat: • Laptop • LCD

	- Menggunakan teorema limit untuk menghitung bentuk tak tentu limit fungsi.			bentuk tak tentu fungsi aljabar.						• OHP
	• Limit fungsi trigonometri : - Teorema limit apit. - Menentukan nilai $\lim_{x\to 0} \frac{\sin x}{x}$. - Menentukan nilai $\lim_{x\to 0} \frac{x}{\sin x}$.			• Memahami teorema limit apit. • Menggunakan teorema limit apit dalam menentukan nilai $\lim_{x\to 0} \frac{\sin x}{x}$ dan $\lim_{x\to 0} \frac{x}{\sin x}$.	• Menghitung limit fungsi trigonometri di suatu titik.	Tugas individu.	Uraian singkat.	Hitunglah nilai $\lim_{x\to \frac{\pi}{4}} \frac{\cos^2 x}{1-\sin x}$.	2 × 45 menit.	Sumber: • Buku paket hal. 124-130. • Buku referensi lain. Alat: • Laptop • LCD • OHP
	• Penggunaan limit			• Menjelaskan penggunaan limit dalam mencari garis singgung suatu kurva di suatu titik tertentu. • Menggunakan limit dalam menentukan laju perubahan suatu	• Menggunakan limit dalam mencari garis singgung suatu kurva dan laju perubahan suatu fungsi.	Tugas individu.	Uraian singkat.	1. Gambarkan garis singgung kurva $f(x) = x^2 - 4x + 3$ di $x = -1,\ 0,\ \frac{1}{2}$.	2 × 45 menit.	Sumber: • Buku paket hal. 130-134, hal 135-138. • Buku referensi lain. Alat:

	• Kekontinuan dan diskontinuan (pengayaan).			fungsi pertumbuhan. • Memahami kekontinuan dan diskontinuan dari suatu fungsi. • Menunjukkan kekontinuan suatu fungsi. • Menghapus diskontinuan suatu fungsi.	• Menyelidiki kekontinuan suatu fungsi.			2. Selidiki kekontinuan fungsi-fungsi berikut: a. $f(x)=\frac{x^2-4}{x-2}$ di $x = 2$ b. $f(x)=\sqrt{x^2+6}$ di $x = 0$		• Laptop • LCD • OHP
	• Limit fungsi aljabar • Teorema-teorema limit • Limit fungsi trigonometri • Penggunaan limit			• Melakukan ulangan harian berisi materi yang berkaitan dengan cara menghitung limit fungsi aljabar di suatu titik dan tak hingga serta menggunakan teorema-teorema limit dalam menghitung limit fungsi aljabar dan trigonometri dan bentuk tak tentu limit fungsi, serta menggunakan limit dalam	• Mengerjakan soal dengan baik berkaitan dengan materi mengenai cara menghitung limit fungsi aljabar di suatu titik dan tak hingga serta menggunakan teorema-teorema limit dalam menghitung limit fungsi aljabar dan trigonometri dan bentuk tak tentu limit fungsi, serta menggunakan limit dalam mencari garis singgung suatu kurva dan laju	Ulangan harian.	Pilihan ganda.	Nilai $\lim_{x\to 1}\left(\frac{2}{x^2-1}-\frac{1}{x-1}\right)$ sama dengan .... a. $-\frac{3}{4}$ d. $\frac{3}{4}$ b. $-\frac{1}{2}$ e. 1 c. $\frac{1}{2}$	2 × 45 menit.	

				mencari garis singgung suatu kurva dan laju perubahan suatu fungsi.	perubahan suatu fungsi.					

Cirebon, Maret 2013
Guru Mata Pelajaran

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Appendix B.2 Lesson Plan for The Experiment Class 1st Adobe Flash CS3

RENCANA PELAKSANAAN PEMBELAJARAN

(RPP)

Nama Sekolah	:	SMAN 5 Kota Cirebon
Mata Pelajaran	:	Matematika
Kelas / Program	:	XI / IPA 3
Semester	:	Genap
Pertemuan Ke-	:	1 - 2

Standar Kompetensi : 6. Menggunakan konsep limit fungsi dan turunan fungsi dalam pemecahan masalah.

Kompetensi Dasar : 6.1. Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.

Alokasi Waktu : 4 x 45 menit (2 pertemuan).

A. Tujuan Pembelajaran

a. Peserta didik dapat menghitung limit fungsi aljabar di suatu titik dan di takhingga dengan baik.

- **Karakter siswa yang diharapkan :**
  - *Rasa ingin tahu, Mandiri, Kreatif, Kerja keras.*
- **Kewirausahaan / Ekonomi Kreatif :**
  - *Berorientasi tugas dan hasil, Percaya diri,Keorisinilan.*

B. Materi Ajar

a. Limit fungsi aljabar:

- Definisi limit secara intiutif.
- Definisi limit secara aljabar.
- Limit fungsi-fungsi berbentuk $\lim_{x \to c} f(x)$ (cara substitusi, faktorisasi, dan perkalian bentuk sekawan).
- Limit fungsi Bentuk Tak hingga

C. Metode Pembelajaran

Ceramah, Media Flash Interaktif, Tanya jawab, diskusi.

Strategi Pembelajaran

Tatap Muka	Terstruktur	Mandiri
• Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.	• Menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar.	• Siswa dapat Menghitung limit fungsi aljabar di suatu titik dan di tak hingga dengan baik.

D. Langkah-langkah Kegiatan

➢ ***<u>Pertemuan ke-1</u>***

Pendahuluan

Apersepsi :

- Pengenalan
- *Ice Breaking*
- Absensi kehadiran peserta didik

- Menyampaikan indikator yang akan dicapai dalam pembelajaran

Kegiatan Inti :

📖 ***Eksplorasi***

Dalam kegiatan eksplorasi :

a. Peserta didik diberikan stimulus berupa pemberian materi oleh guru dengan menggunakan media flash interaktif menggunakan infokus mengenai arti limit fungsi di suatu titik dan cara menghitung limit fungsi aljabar di suatu titik dan tak hingga, kemudian antara peserta didik dan guru mendiskusikan materi tersebut
b. Peserta didik mengkomunikasikan secara lisan atau mempresentasikan arti limit fungsi secara intuitif dan aljabar serta menghitung limit fungsi aljabar di suatu titik dan tak hingga.

📖 ***Elaborasi***

Dalam kegiatan elaborasi,

a. Peserta didik dan guru secara bersama-sama membahas contoh soal yang ada di dalam slide flash mengenai arti limit fungsi secara intiutif, mengenai cara menghitung limit fungsi aljabar dengan cara substitusi, faktorisasi, atau perkalian sekawan, mengenai cara menghitung limit fungsi aljabar di tak hingga.
b. Peserta didik mengerjakan beberapa soal yang ada didalam slide flash mengenai cara menghitung limit fungsi aljabar di suatu titik dengan cara substitusi, faktorisasi, atau perkalian sekawan dan menghitung limit fungsi aljabar di tak hingga
c. Peserta didik dan guru secara bersama-sama membahas jawaban soal-soal yang telah dikerjakan oleh siswa.

📖 ***Konfirmasi***

Dalam kegiatan konfirmasi, Siswa:

a. Menjelaskan tentang hal-hal yang belum diketahui.

b. Memberikan kesempatan kepada siswa untuk bertanya terkait materi yang telah disampaikan.

Penutup

a. Peserta didik membuat rangkuman dari materi mengenai arti limit fungsi secara intuitif dan aljabar serta menghitung limit fungsi aljabar di suatu titik dan tak hingga.
b. Guru menyimpulkan materi yang telah diajarkan mengenai arti limit fungsi secara intuitif dan aljabar serta menghitung limit fungsi aljabar di suatu titik dan tak hingga..
c. Peserta didik diberikan pekerjaan rumah (PR) berkaitan dengan materi mengenai arti limit fungsi secara intuitif dan aljabar serta menghitung limit fungsi aljabar di suatu titik dan tak hingga.

- ***Pertemuan ke-2***

Pendahuluan

Apersepsi :

- Absensi kehadiran peserta didik
- Mengingatkan kembali materi yang sudah diajarkan sebelumnya tentang menghitung limit fungsi berbentuk $\lim_{x \to c} f(x)$ (cara substitusi, faktorisasi, dan perkalian bentuk sekawan).
- Menyampaikan indikator yang akan dicapai dalam pembelajaran

Kegiatan Inti :

- ***Eksplorasi***

Dalam kegiatan eksplorasi :

a. Peserta didik diberikan stimulus berupa pemberian materi oleh guru dengan menggunakan media flash interaktif menggunakan infokus mengenai menghitung limit fungsi aljabar di takhingga kemudian antara peserta didik dan guru mendiskusikan materi tersebut

b. Peserta didik mengkomunikasikan secara lisan atau mempresentasikan sifat-sifat yang digunakan dalam perhitungan limit dan cara menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar.

🕮 ***Elaborasi***

Dalam kegiatan elaborasi,

a. Peserta didik dan guru secara bersama-sama membahas contoh soal yang ada di dalam slide flash mengenai cara menghitung limit fungsi aljabar di tak hingga.
b. Peserta didik dan guru secara bersama-sama membahas jawaban soal-soal dari Aktivitas Kelas dalam buku paket maupun LKS.

🕮 ***Konfirmasi***

Dalam kegiatan konfirmasi, Siswa:

a. Menyimpulkan tentang hal-hal yang belum diketahui
b. Menjelaskan tentang hal-hal yang belum diketahui.

Penutup

a. Guru memberikan kesempatan kepada peserta didik untuk menanyakan terkait materi yang telah diajarkan.
b. Peserta didik diberikan pekerjaan rumah (PR) berkaitan dengan materi mengenai menghitung limit tak hingga fungsi aljabar dari soal-soal Aktivitas Kelas dan Latihan yang belum terselesaikan di dalam kelas atau dari referensi lain.

E. Alat dan Sumber Belajar

Sumber :

- Media Flash Interaktif
- Buku Paket, yaitu Matematika untuk SMA/ MA Ringkasan Materi kelas X, XI, XII, karangan Ahmad Zaelani, dkk. hal 327

- Seribu Pena Matematika untuk SMA/MA Kelas XI, karangan Husein Tampomas, hal 303. Erlangga
- Buku referensi lain.

Alat :

- Laptop
- LCD
- OHP

F. Penilaian

Teknik : tugas individu, ulangan harian.

Bentuk Instrumen : uraian singkat

Contoh Instrumen :

1. Tentukan limit fungsi-fungsi berikut ini:

   a. $\lim_{x\to 1}\left(2x^2-3\right)$

   b. $\lim_{x\to 1}\dfrac{\left(x^2+3x-4\right)}{x-1}$

   c. $\lim_{x\to 0}\dfrac{3-\sqrt{2x+9}}{x}$

   d. $\lim_{x\to \infty} x+\sqrt{x^2-4}$

Jawaban

a. $\lim_{x\to 1}\left(2x^2-3\right)$

$= (2(1)^2-3)$
$= 2-3$
$= -1$

b. $\lim_{x\to 1}\dfrac{\left(x^2+3x-4\right)}{x-1}$

$$= \lim_{x \to 1} \frac{(x-1)(x+4)}{x-1}$$

$$= \lim_{x \to 1} (x+4)$$

$$= (1+4) = 5$$

c. $\lim_{x \to 0} \frac{3-\sqrt{2x+9}}{x}$

$$= \lim_{x \to 0} \frac{3-\sqrt{2x+9}}{x} \cdot \frac{3+\sqrt{2x+9}}{3+\sqrt{2x+9}}$$

$$= \lim_{x \to 0} \frac{9-(2x+9)}{x(3+\sqrt{2x+9})}$$

$$= \lim_{x \to 0} \frac{-2x}{x(3+\sqrt{2x+9})} \cdot$$

$$= \lim_{x \to 0} \frac{-2}{(3+\sqrt{2x+9})}$$

$$= \frac{-2}{(3+\sqrt{2(0)+9})}$$

$$= \frac{-2}{(3+3)} \cdot = -\frac{1}{3}$$

d. $\lim_{x \to \infty} x + \sqrt{x^2-4}$

$$= \lim_{x \to \infty} \frac{x}{x} + \sqrt{\frac{x^2}{x^2} - \frac{4}{x}}$$

$$= 1 + \sqrt{1-0} = 2$$

Mengetahui
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Cirebon, Maret 2013
Peneliti

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RENCANA PELAKSANAAN PEMBELAJARAN
(RPP)

Nama Sekolah	:	SMAN 5 Kota Cirebon
Mata Pelajaran	:	Matematika
Kelas / Program	:	XI / IPA 3
Semester	:	Genap
Pertemuan Ke-	:	3

Standar Kompetensi : 6. Menggunakan konsep limit fungsi dan turunan fungsi dalam pemecahan masalah.

Kompetensi Dasar : 6.1. Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.

Alokasi Waktu : 2 x 45 (1 pertemuan).

A. Tujuan Pembelajaran

a. Peserta didik dapat menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri dengan baik.

❽ **Karakter siswa yang diharapkan :**

- *Rasa ingin tahu, Mandiri, Kreatif, Kerja keras.*

❽ **Kewirausahaan / Ekonomi Kreatif :**

- *Berorientasi tugas dan hasil, Percaya diri,Keorisinilan.*

B. Materi Ajar

a. Memahami teorema-teorema limit

b. Menggunakan teorema limit dalam menghitung bentuk tak tentu fungsi aljabar

C. Metode Pembelajaran

Ceramah, Media Flash interaktif, Tanya jawab, Diskusi kelompok.

Strategi Pembelajaran

Tatap Muka	Terstruktur	Mandiri
• Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.	• Menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar.	• Peserta didik dapat menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri

D. Langkah-langkah Kegiatan

Pendahuluan

Apersepsi :

- Absensi kehadiran peserta didik
- Mengingatkan kembali materi yang sudah diajarkan sebelumnya tentang menghitung limit fungsi tak hingga.
- Menyampaikan indikator yang akan dicapai dalam pembelajaran

Kegiatan Inti :

📖 ***Eksplorasi***

Dalam kegiatan eksplorasi :

a. Peserta didik diberikan stimulus berupa pemberian materi oleh guru dengan menggunakan media flash interaktif menggunakan infokus

mengenai sifat-sifat yang digunakan dalam perhitungan limit fungsi dan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar, kemudian antara peserta didik dan guru mendiskusikan materi tersebut

b. Peserta didik mengkomunikasikan secara lisan atau mempresentasikan sifat-sifat yang digunakan dalam perhitungan limit dan cara menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar.

📖 ***Elaborasi***

Dalam kegiatan elaborasi,

a. Peserta didik mengerjakan beberapa soal mengenai sifat-sifat yang digunakan dalam perhitungan limit dari Aktivitas Kelas dalam buku paket maupun LKS.
b. Peserta didik dan guru secara bersama-sama membahas jawaban soal-soal dari Aktivitas Kelas dalam buku paket maupun LKS.
c. Peserta didik diingatkan untuk mempelajari sifat-sifat yang digunakan dalam perhitungan limit, dan sifat limit yang digunakan untuk menghitung bentuk tak tentu fungsi aljabar.

📖 ***Konfirmasi***

Dalam kegiatan konfirmasi, Siswa:

a. Menyimpulkan tentang hal-hal yang belum diketahui
b. Menjelaskan tentang hal-hal yang belum diketahui.

Penutup

a. Peserta didik membuat rangkuman dari materi mengenai sifat-sifat yang digunakan dalam perhitungan limit dan sifat limit untuk menghitung bentuk tak tentu fungsi aljabar.
b. Guru memberikan kesempatan kepada peserta didik untuk menanyakan terkait materi yang telah diajarkan.

c. Peserta didik diberikan pekerjaan rumah (PR) berkaitan dengan materi mengenai sifat-sifat yang digunakan dalam perhitungan limit dan sifat limit untuk menghitung bentuk tak tentu fungsi aljabar dari soal-soal Aktivitas Kelas dan Latihan yang belum terselesaikan di dalam kelas atau dari referensi lain.

E. Alat dan Sumber Belajar

Sumber :

- Media Flash Interaktif
- Buku Paket, yaitu Matematika untuk SMA/ MA Ringkasan Materi kelas X, XI, XII, karangan Ahmad Zaelani, dkk. hal 337
- Seribu Pena Matematika untuk SMA/MA Kelas XI, karangan Husein Tampomas, hal 311.
- Buku referensi lain.

Alat :

- Laptop
- LCD
- OHP

F. Penilaian

Teknik : tugas individu, ulangan harian.

Bentuk Instrumen : uraian singkat

Contoh Instrumen :

1. Dengan menggunakan sifat limit, tentukan nilai

   a. $\lim\limits_{x\to 2} \dfrac{x^2+4}{x-1}$

   b. $\lim\limits_{x\to 3}\left(2x^2-3x+1\right)$

Jawaban

a. $\lim\limits_{x\to 2} \dfrac{x^2+4}{x-1}$

$= \dfrac{\lim\limits_{x\to 2}(x^2+4)}{\lim\limits_{x\to 2}(x-1)}$

$= \dfrac{\lim\limits_{x\to 2} x^2 + \lim\limits_{x\to 2} 4)}{\lim\limits_{x\to 2} x - \lim\limits_{x\to 2} 1}$

$= \dfrac{4+4}{2-1}$

$= 8$

b. $\lim\limits_{x\to 3}\left(2x^2-3x+1\right)$

$= \lim\limits_{x\to 3} 2x^2 - \lim\limits_{x\to 3} 3x + \lim\limits_{x\to 3} 1$

$= 2\lim\limits_{x\to 3} x^2 - 3\lim\limits_{x\to 3} x + \lim\limits_{x\to 3} 1$

$= 2\left[\lim\limits_{x\to 3} x\right]^2 - 3\lim\limits_{x\to 3} x + \lim\limits_{x\to 3} 1$

$= 2(3)^2 - 3(3) + 1$

$= 18 - 8$

$= 10$

Mengetahui
Guru Mata Pelajaran

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RENCANA PELAKSANAAN PEMBELAJARAN
(RPP)

Nama Sekolah	:	SMAN 5 Kota Cirebon
Mata Pelajaran	:	Matematika
Kelas / Program	:	XI / IPA 3
Semester	:	Genap
Pertemuan Ke-	:	4

Standar Kompetensi : 6. Menggunakan konsep limit fungsi dan turunan fungsi dalam pemecahan masalah.

Kompetensi Dasar : 6.1. Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.

Alokasi Waktu : 2 x 45 (1 pertemuan).

A. Tujuan Pembelajaran

a. Peserta didik dapat menghitung limit fungsi trigonometri di suatu titik dengan benar.

❽ **Karakter siswa yang diharapkan :**

- *Rasa ingin tahu, Mandiri, Kreatif, Kerja keras.*

❽ **Kewirausahaan / Ekonomi Kreatif :**

- *Berorientasi tugas dan hasil, Percaya diri, Keorisinilan.*

B. Materi Ajar

a. Limit fungsi trigonometri :

- Teorema limit apit.

- Menentukan nilai $\lim_{x\to 0}\frac{\sin x}{x}$.

- Menentukan nilai $\lim_{x\to 0}\frac{x}{\sin x}$.

C. Metode Pembelajaran

Ceramah, Media Interaktif, Tanya jawab, Diskusi kelompok.

Strategi Pembelajaran

Tatap Muka	Terstruktur	Mandiri
• Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.	• Menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar.	• Peserta didik dapat menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri

D. Langkah-langkah Kegiatan

Pendahuluan

Apersepsi :

- Absensi kehadiran peserta didik
- Menyampaikan indikator yang akan dicapai dalam pembelajaran

Kegiatan Inti :

📖 ***Eksplorasi***

Dalam kegiatan eksplorasi :

a. Peserta didik diberikan stimulus berupa pemberian materi oleh guru dengan menggunakan media flash interaktif menggunakan infokus

mengenai cara menghitung limit fungsi trigonometri di satu titik dan menjelaskan sifat-sifat yang digunakan dalam perhitungan limit kemudian antara peserta didik dan guru mendiskusikan materi tersebut

b. Peserta didik mengkomunikasikan secara lisan atau mempresentasikan cara menghitung limit fungsi trigonometri di suatu titik dan menjelaskan sifat-sifat yang digunakan dalam perhitungan limit.

📖 ***Elaborasi***

Dalam kegiatan elaborasi,

a. Peserta didik dan guru secara bersama-sama membahas contoh soal yang ada di dalam slide flash mengenai cara menghitung limit fungsi trigonometri di satu titik dan sifat-sifat yang digunakan dalam perhitungan limit.
b. Peserta didik mengerjakan beberapa soal mengenai menghitung limit fungsi trigonometri di satu titik dan sifat-sifat yang digunakan dalam perhitungan limit dari Aktivitas Kelas dalam buku paket maupun LKS.
c. Peserta didik dan guru secara bersama-sama membahas jawaban soal-soal dari Aktivitas Kelas dalam buku paket maupun LKS.

📖 ***Konfirmasi***

Dalam kegiatan konfirmasi, Siswa:

a. Menyimpulkan tentang hal-hal yang belum diketahui
b. Menjelaskan tentang hal-hal yang belum diketahui.

Penutup

a. Peserta didik membuat rangkuman materi mengenai cara menghitung limit fungsi trigonometri di satu titik dan sifat-sifat yang digunakan dalam perhitungan limit.

b. Guru memberikan kesempatan kepada peserta didik untuk menanyakan terkait materi yang telah diajarkan.

c. Peserta didik diberikan pekerjaan rumah (PR) berkaitan dengan materi mengenai cara menghitung limit fungsi trigonometri di satu titik dan menjelaskan sifat-sifat yang digunakan dalam perhitungan limit dari soal-soal Aktivitas Kelas dan Latihan yang belum terselesaikan di dalam kelas atau dari referensi lain.

E. Alat dan Sumber Belajar

Sumber :

- Media Flash Interaktif
- Buku Paket, yaitu Matematika untuk SMA/ MA Ringkasan Materi kelas X, XI, XII, karangan Ahmad Zaelani, dkk. hal 339
- Seribu Pena Matematika untuk SMA/MA Kelas XI, karangan Husein Tampomas, hal 324.
- Buku referensi lain.

Alat :

- Laptop
- LCD
- OHP

F. Penilaian

Teknik : tugas individu, ulangan harian.

Bentuk Instrumen : uraian singkat

1. Tentukan limit fungsi-fungsi trigonometri berikut ini:

a. $\lim_{x\to 0}\frac{\sin 5x}{\sin 3x} = ...$

b. $\lim_{x\to 0}\frac{x.\tan x}{1-\cos 2x} = ...$

Jawaban

a. $\lim_{x\to 0}\frac{\sin 5x}{\sin 3x} = ...$

$= \lim_{x\to 0}\frac{\sin 5x}{5x}.5x.\frac{3x}{\sin 3x}.\frac{1}{3x}$

$=1.5x.1.\frac{1}{3x}$

$=\frac{5}{3}$

b. $\lim_{x\to 0}\frac{x.\tan x}{1-\cos 2x} = ...$

$= \lim_{x\to 0}\frac{x.\tan x}{1-(1-2\sin^2 x)}$

$= \lim_{x\to 0}\frac{x.\tan x}{2\sin^2 x}$

$= \frac{1}{2}\lim_{x\to 0}\frac{x^2}{\sin^2 x}.\frac{\tan x}{x}.$

$= \frac{1}{2}.1.1$

$= \frac{1}{2}$

Mengetahui
Guru Mata Pelajaran

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Cirebon, April 2013
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RENCANA PELAKSANAAN PEMBELAJARAN

(RPP)

Nama Sekolah	:	SMAN 5 Kota Cirebon
Mata Pelajaran	:	Matematika
Kelas / Program	:	XI / IPA 3
Semester	:	Genap
Pertemuan ke-	:	5

Standar Kompetensi : 6. Menggunakan konsep limit fungsi dan turunan fungsi dalam pemecahan masalah.

Kompetensi Dasar : 6.1. Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.

Alokasi Waktu : 2 x 45 menit (1 pertemuan).

A. Tujuan Pembelajaran

a. Peserta didik dapat menggunakan limit dalam mencari gais singgung suatu kurva dan laju perubahan suatu fungsi dengan benar.
b. Peserta didik dapat menyelidiki kekontinuan suatu fungsi dengan benar.

Karakter siswa yang diharapkan :

- *Rasa ingin tahu, Mandiri, Kreatif, Kerja keras.*

Kewirausahaan / Ekonomi Kreatif :

- *Berorientasi tugas dan hasil, Percaya diri,Keorisinilan.*

B. Materi Ajar

a. Penggunaan limit

b. Kekontinuan fungsi

C. Metode Pembelajaran

Ceramah, Media flash interaktif, Tanya jawab, Diskusi kelompok.

D. Langkah-langkah Kegiatan

Pendahuluan

Apersepsi : Membahas PR dan mengingat kembali materi mengenai cara menghitung limit fungsi aljabar dan trigonometri di suatu titik dan tak hingga serta sifat-sifat yang digunakan dalam perhitungan limit.

Kegiatan Inti :

- ***Eksplorasi***

Dalam kegiatan eksplorasi :

a. Peserta didik diberikan stimulus berupa pemberian materi oleh guru dengan menggunakan animasi flash mengenai penggunaan limit serta kekontinuan dan diskontinuan (pengayaan), kemudian antara peserta didik dan guru mendiskusikan materi tersebut

b. Peserta didik mengkomunikasikan secara lisan atau mempresentasikan penggunaan limit serta kekontinuan dan diskontinuan.

- ***Elaborasi***

Dalam kegiatan elaborasi,

a. Peserta didik mengerjakan beberapa soal mengenai penggunaan limit serta kekontinuan dan diskontinuan dari Aktivitas Kelas dalam buku paket .

b. Peserta didik dan guru secara bersama-sama membahas jawaban soal-soal dari Aktivitas Kelas dalam buku paket.

c. Peserta didik mengerjakan soal-soal Latihan mengenai penggunaan limit serta kekontinuan dan diskontinuan dalam buku paket.

🕮 ***Konfirmasi***

Dalam kegiatan konfirmasi, Siswa:

a. Menyimpulkan tentang hal-hal yang belum diketahui
b. Menjelaskan tentang hal-hal yang belum diketahui.

Penutup

a. Peserta didik membuat rangkuman dari materi mengenai penggunaan limit serta kekontinuan dan diskontinuan.
b. Peserta didik dan guru melakukan refleksi.
c. Peserta didik diberikan pekerjaan rumah (PR) berkaitan dengan materi mengenai penggunaan limit serta kekontinuan dan diskontinuan dari soal-soal Aktivitas Kelas dan Latihan yang belum terselesaikan di dalam kelas atau dari referensi lain.

E. Alat dan Sumber Belajar

Sumber :

- Media Flash Interaktif
- Buku Paket, yaitu Matematika untuk SMA/ MA Ringkasan Materi kelas X, XI, XII, karangan Ahmad Zaelani, dkk. hal 345
- Seribu Pena Matematika untuk SMA/MA Kelas XI, karangan Husein Tampomas, hal 315. Erlangga
- Buku referensi lain.

Alat :

- Laptop
- LCD
- OHP

F. Penilaian

Teknik : tugas individu, ulangan harian.

Bentuk Instrumen : uraian singkat

Contoh instrumen

1. Gambarkan garis singgung kurva $f(x) = x^2 - 4x + 3$ di $x = -1,\ 0,\ \frac{1}{2}$.
2. Selidiki kekontinuan fungsi-fungsi berikut:

   c. $f(x) = \frac{x^2 - 4}{x - 2}$ di $x = 2$

Mengetahui
Guru Mata Pelajaran

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Appendix B.3 Lesson Plan for The Experiment Class 2nd iMindMap

RENCANA PELAKSANAAN PEMBELAJARAN

(RPP)

Nama Sekolah	:	SMAN 5 Kota Cirebon
Mata Pelajaran	:	Matematika
Kelas / Program	:	XI / IPA 4
Semester	:	Genap
Pertemuan Ke-	:	1 - 2

Standar Kompetensi : 6. Menggunakan konsep limit fungsi dan turunan fungsi dalam pemecahan masalah.

Kompetensi Dasar : 6.1. Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.

Alokasi Waktu : 4 x 45 menit (2 pertemuan).

A. Tujuan Pembelajaran

a. Peserta didik dapat menghitung limit fungsi aljabar di suatu titik dan di takhingga dengan baik.

Karakter siswa yang diharapkan :

- *Rasa ingin tahu, Mandiri, Kreatif, Kerja keras.*

Kewirausahaan / Ekonomi Kreatif :

- *Berorientasi tugas dan hasil, Percaya diri,Keorisinilan.*

B. Materi Ajar

a. Limit fungsi aljabar:

- Definisi limit secara intiutif.

- Definisi limit secara aljabar.
- Limit fungsi-fungsi berbentuk $\lim_{x \to c} f(x)$ (cara substitusi, faktorisasi, dan perkalian bentuk sekawan).
- Limit fungsi Bentuk Tak hingga

C. Metode Pembelajaran

Ceramah, *Mind mapping*, Tanya jawab, diskusi.

Strategi Pembelajaran

Tatap Muka	Terstruktur	Mandiri
• Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.	• Menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar.	• Siswa dapat Menghitung limit fungsi aljabar di suatu titik dan di tak hingga dengan baik.

D. Langkah-langkah Kegiatan

➢ ***Pertemuan ke-1***

Pendahuluan

Apersepsi :

- Pengenalan
- *Ice Breaking*
- Absensi kehadiran peserta didik
- Menyampaikan indikator yang akan dicapai dalam pembelajaran

Kegiatan Inti :

- ***Eksplorasi***

Dalam kegiatan eksplorasi :

a. Guru menjelaskan gambaran secara umum materi limit yang akan dipelajari dengan menggunakan *software iMindMap*
b. Peserta didik diberikan stimulus berupa pemberian materi oleh guru dengan menggunakan *mind mapping* mengenai arti limit fungsi di suatu titik dan cara menghitung limit fungsi aljabar di suatu titik dan tak hingga, kemudian antara peserta didik dan guru mendiskusikan materi tersebut
c. Peserta didik mengkomunikasikan secara lisan atau mempresentasikan arti limit fungsi secara intuitif dan aljabar serta menghitung limit fungsi aljabar di suatu titik dan tak hingga.

- ***Elaborasi***

Dalam kegiatan elaborasi,

a. Peserta didik dan guru secara bersama-sama membahas contoh soal yang ada di dalam buku paket mengenai arti limit fungsi secara intiutif, mengenai cara menghitung limit fungsi aljabar dengan cara substitusi, faktorisasi, atau perkalian sekawan, mengenai cara menghitung limit fungsi aljabar di tak hingga.
b. Peserta didik mengerjakan beberapa soal yang ada didalam buku paket mengenai cara menghitung limit fungsi aljabar di suatu titik dengan cara substitusi, faktorisasi, atau perkalian sekawan dan menghitung limit fungsi aljabar di tak hingga
c. Peserta didik dan guru secara bersama-sama membahas jawaban soal-soal yang telah dikerjakan oleh siswa.

- ***Konfirmasi***

Dalam kegiatan konfirmasi, Siswa:

a. Menjelaskan tentang hal-hal yang belum diketahui.

b. Memberikan kesempatan kepada siswa untuk bertanya terkait materi yang telah disampaikan.

Penutup

a. Peserta didik membuat rangkuman dari materi mengenai arti limit fungsi secara intuitif dan aljabar serta menghitung limit fungsi aljabar di suatu titik dan tak hingga.
b. Guru menyimpulkan materi yang telah diajarkan mengenai arti limit fungsi secara intuitif dan aljabar serta menghitung limit fungsi aljabar di suatu titik dan tak hingga..
c. Peserta didik diberikan pekerjaan rumah (PR) berkaitan dengan materi mengenai arti limit fungsi secara intuitif dan aljabar serta menghitung limit fungsi aljabar di suatu titik dan tak hingga.

- ***Pertemuan ke-2***

Pendahuluan

Apersepsi :

- Absensi kehadiran peserta didik
- Mengingatkan kembali materi yang sudah diajarkan sebelumnya tentang menghitung limit fungsi berbentuk $\lim_{x \to c} f(x)$ (cara substitusi, faktorisasi, dan perkalian bentuk sekawan).
- Menyampaikan indikator yang akan dicapai dalam pembelajaran

Kegiatan Inti :

📖 ***Eksplorasi***

Dalam kegiatan eksplorasi :

a. Peserta didik diberikan stimulus berupa pemberian materi oleh guru dengan melihat *mind mapping* mengenai menghitung limit fungsi aljabar di takhingga kemudian antara peserta didik dan guru mendiskusikan materi tersebut

b. Peserta didik mengkomunikasikan secara lisan atau mempresentasikan sifat-sifat yang digunakan dalam perhitungan limit dan cara menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar.

🕮 ***Elaborasi***

Dalam kegiatan elaborasi,

a. Peserta didik dan guru secara bersama-sama membahas contoh soal yang ada di dalam buku paket mengenai cara menghitung limit fungsi aljabar di tak hingga.
b. Peserta didik dan guru secara bersama-sama membahas jawaban soal-soal dari Aktivitas Kelas dalam buku paket maupun LKS.

🕮 ***Konfirmasi***

Dalam kegiatan konfirmasi, Siswa:

a. Menyimpulkan tentang hal-hal yang belum diketahui
b. Menjelaskan tentang hal-hal yang belum diketahui.

Penutup

a. Guru memberikan kesempatan kepada peserta didik untuk menanyakan terkait materi yang telah diajarkan.
b. Peserta didik diberikan pekerjaan rumah (PR) berkaitan dengan materi mengenai menghitung limit tak hingga fungsi aljabar dari soal-soal Aktivitas Kelas dan Latihan yang belum terselesaikan di dalam kelas atau dari referensi lain.

E. Alat dan Sumber Belajar

Sumber :

- *Mind mapping*
- Buku Paket, yaitu Matematika untuk SMA/ MA Ringkasan Materi kelas X, XI, XII, karangan Ahmad Zaelani, dkk. hal 327

- Seribu Pena Matematika untuk SMA/MA Kelas XI, karangan Husein Tampomas, hal 303. Erlangga
- Buku referensi lain.

Alat :

- Laptop
- LCD
- OHP

F. Penilaian

Teknik : tugas individu, ulangan harian.

Bentuk Instrumen : uraian singkat

Contoh Instrumen :

1. Tentukan limit fungsi-fungsi berikut ini:

   a. $\lim_{x\to 1}\left(2x^2-3\right)$

   b. $\lim_{x\to 1}\dfrac{\left(x^2+3x-4\right)}{x-1}$

   c. $\lim_{x\to 0}\dfrac{3-\sqrt{2x+9}}{x}$

   d. $\lim_{x\to \infty} x+\sqrt{x^2-4}$

Jawaban

a. $\lim_{x\to 1}\left(2x^2-3\right)$

$= (2(1)^2-3)$
$= 2-3$
$= -1$

b. $\lim_{x\to 1}\dfrac{\left(x^2+3x-4\right)}{x-1}$

$$= \lim_{x \to 1} \frac{(x-1)(x+4)}{x-1}$$

$$= \lim_{x \to 1} (x+4)$$

$$= (1+4) = 5$$

c. $\lim_{x \to 0} \frac{3-\sqrt{2x+9}}{x}$

$$= \lim_{x \to 0} \frac{3-\sqrt{2x+9}}{x} \cdot \frac{3+\sqrt{2x+9}}{3+\sqrt{2x+9}}$$

$$= \lim_{x \to 0} \frac{9-(2x+9)}{x(3+\sqrt{2x+9})}$$

$$= \lim_{x \to 0} \frac{-2x}{x(3+\sqrt{2x+9})} \cdot$$

$$= \lim_{x \to 0} \frac{-2}{(3+\sqrt{2x+9})}$$

$$= \frac{-2}{(3+\sqrt{2(0)+9})}$$

$$= \frac{-2}{(3+3)} \cdot = -\frac{1}{3}$$

d. $\lim_{x \to \infty} x + \sqrt{x^2-4}$

$$= \lim_{x \to \infty} \frac{x}{x} + \sqrt{\frac{x^2}{x^2} - \frac{4}{x}}$$

$$= 1 + \sqrt{1-0} = 2$$

Mengetahui
Guru Mata Pelajaran

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Cirebon, Maret 2013
Peneliti

Sudianto
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RENCANA PELAKSANAAN PEMBELAJARAN
(RPP)

Nama Sekolah	:	SMAN 5 Kota Cirebon
Mata Pelajaran	:	Matematika
Kelas / Program	:	XI / IPA 4
Semester	:	Genap
Pertemuan Ke-	:	3

Standar Kompetensi : 6. Menggunakan konsep limit fungsi dan turunan fungsi dalam pemecahan masalah.

Kompetensi Dasar : 6.1. Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.

Alokasi Waktu : 2 x 45 (1 pertemuan).

A. Tujuan Pembelajaran

a. Peserta didik dapat menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri dengan baik.

❽ **Karakter siswa yang diharapkan :**

- *Rasa ingin tahu, Mandiri, Kreatif, Kerja keras.*

❽ **Kewirausahaan / Ekonomi Kreatif :**

- *Berorientasi tugas dan hasil, Percaya diri,Keorisinilan.*

B. Materi Ajar

a. Memahami teorema-teorema limit

b. Menggunakan teorema limit dalam menghitung bentuk tak tentu fungsi aljabar

C. Metode Pembelajaran

Ceramah, *Mind mapping*, Tanya jawab, Diskusi kelompok.

Strategi Pembelajaran

Tatap Muka	Terstruktur	Mandiri
• Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.	• Menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar.	• Peserta didik dapat menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri

D. Langkah-langkah Kegiatan

Pendahuluan

Apersepsi :

- Absensi kehadiran peserta didik
- Mengingatkan kembali materi yang sudah diajarkan sebelumnya tentang menghitung limit fungsi tak hingga.
- Menyampaikan indikator yang akan dicapai dalam pembelajaran

Kegiatan Inti :

📖 ***Eksplorasi***

Dalam kegiatan eksplorasi :

a. Peserta didik diberikan stimulus berupa pemberian materi oleh guru dengan melihat *mind mapping* mengenai sifat-sifat yang digunakan

dalam perhitungan limit fungsi dan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar, kemudian antara peserta didik dan guru mendiskusikan materi tersebut

b. Peserta didik mengkomunikasikan secara lisan atau mempresentasikan sifat-sifat yang digunakan dalam perhitungan limit dan cara menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar.

📖 ***Elaborasi***

Dalam kegiatan elaborasi,

a. Peserta didik mengerjakan beberapa soal mengenai sifat-sifat yang digunakan dalam perhitungan limit dari Aktivitas Kelas dalam buku paket maupun LKS.
b. Peserta didik dan guru secara bersama-sama membahas jawaban soal-soal dari Aktivitas Kelas dalam buku paket maupun LKS.
c. Peserta didik diingatkan untuk mempelajari sifat-sifat yang digunakan dalam perhitungan limit, dan sifat limit yang digunakan untuk menghitung bentuk tak tentu fungsi aljabar.

📖 ***Konfirmasi***

Dalam kegiatan konfirmasi, Siswa:

a. Menyimpulkan tentang hal-hal yang belum diketahui
b. Menjelaskan tentang hal-hal yang belum diketahui.

Penutup

a. Peserta didik membuat rangkuman dari materi mengenai sifat-sifat yang digunakan dalam perhitungan limit dan sifat limit untuk menghitung bentuk tak tentu fungsi aljabar.
b. Guru memberikan kesempatan kepada peserta didik untuk menanyakan terkait materi yang telah diajarkan.
c. Peserta didik diberikan pekerjaan rumah (PR) berkaitan dengan materi mengenai sifat-sifat yang digunakan dalam perhitungan limit dan sifat

limit untuk menghitung bentuk tak tentu fungsi aljabar dari soal-soal Aktivitas Kelas dan Latihan yang belum terselesaikan di dalam kelas atau dari referensi lain.

E. Alat dan Sumber Belajar

Sumber :

- *Mind mapping*
- Buku Paket, yaitu Matematika untuk SMA/ MA Ringkasan Materi kelas X, XI, XII, karangan Ahmad Zaelani, dkk. hal 337
- Seribu Pena Matematika untuk SMA/MA Kelas XI, karangan Husein Tampomas, hal 311.
- Buku referensi lain.

Alat :

- Laptop
- LCD
- OHP

F. Penilaian

Teknik : tugas individu, ulangan harian.

Bentuk Instrumen : uraian singkat

Contoh Instrumen :

1. Dengan menggunakan sifat limit, tentukan nilai

   a. $\lim\limits_{x\to 2} \dfrac{x^2+4}{x-1}$

   b. $\lim\limits_{x\to 3}\left(2x^2-3x+1\right)$

Jawaban

a. $\lim\limits_{x\to 2} \dfrac{x^2+4}{x-1}$

$$= \frac{\lim\limits_{x\to 2}(x^2+4)}{\lim\limits_{x\to 2}(x-1)}$$

$$= \frac{\lim\limits_{x\to 2} x^2 + \lim\limits_{x\to 2} 4}{\lim\limits_{x\to 2} x - \lim\limits_{x\to 2} 1}$$

$$= \frac{4+4}{2-1}$$

$$= 8$$

b. $\lim\limits_{x\to 3}\left(2x^2-3x+1\right)$

$$= \lim_{x\to 3} 2x^2 - \lim_{x\to 3} 3x + \lim_{x\to 3} 1$$

$$= 2\lim_{x\to 3} x^2 - 3\lim_{x\to 3} x + \lim_{x\to 3} 1$$

$$= 2\left[\lim_{x\to 3} x\right]^2 - 3\lim_{x\to 3} x + \lim_{x\to 3} 1$$

$$= 2(3)^2 - 3(3) + 1$$

$$= 18 - 8$$

$$= 10$$

Mengetahui
Guru Mata Pelajaran

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Cirebon, April 2013
Peneliti

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RENCANA PELAKSANAAN PEMBELAJARAN
(RPP)

Nama Sekolah	:	SMAN 5 Kota Cirebon
Mata Pelajaran	:	Matematika
Kelas / Program	:	XI / IPA 4
Semester	:	Genap
Pertemuan Ke-	:	4

Standar Kompetensi : 6. Menggunakan konsep limit fungsi dan turunan fungsi dalam pemecahan masalah.

Kompetensi Dasar : 6.1. Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.

Alokasi Waktu : 2 x 45 (1 pertemuan).

A. Tujuan Pembelajaran

a. Peserta didik dapat menghitung limit fungsi trigonometri di suatu titik dengan benar.

❽ **Karakter siswa yang diharapkan :**

- *Rasa ingin tahu, Mandiri, Kreatif, Kerja keras.*

❽ **Kewirausahaan / Ekonomi Kreatif :**

- *Berorientasi tugas dan hasil, Percaya diri,Keorisinilan.*

B. Materi Ajar

a. Limit fungsi trigonometri :

- Teorema limit apit.

- Menentukan nilai $\lim_{x\to 0}\frac{\sin x}{x}$.

- Menentukan nilai $\lim_{x\to 0}\frac{x}{\sin x}$.

C. Metode Pembelajaran

Ceramah, *Mind mapping*, Tanya jawab, Diskusi kelompok.

Strategi Pembelajaran

Tatap Muka	Terstruktur	Mandiri
• Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.	• Menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar.	• Peserta didik dapat menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri

D. Langkah-langkah Kegiatan

Pendahuluan

Apersepsi :

- Absensi kehadiran peserta didik
- Menyampaikan indikator yang akan dicapai dalam pembelajaran

Kegiatan Inti :

📖 ***Eksplorasi***

Dalam kegiatan eksplorasi :

a. Peserta didik diberikan stimulus berupa pemberian materi oleh guru dengan melihat *mind mapping* mengenai cara menghitung limit

fungsi trigonometri di satu titik dan menjelaskan sifat-sifat yang digunakan dalam perhitungan limit kemudian antara peserta didik dan guru mendiskusikan materi tersebut

b. Peserta didik mengkomunikasikan secara lisan atau mempresentasikan cara menghitung limit fungsi trigonometri di suatu titik dan menjelaskan sifat-sifat yang digunakan dalam perhitungan limit.

📖 ***Elaborasi***

Dalam kegiatan elaborasi,

a. Peserta didik dan guru secara bersama-sama membahas contoh soal yang ada di dalam buku paket mengenai cara menghitung limit fungsi trigonometri di satu titik dan sifat-sifat yang digunakan dalam perhitungan limit.
b. Peserta didik mengerjakan beberapa soal mengenai menghitung limit fungsi trigonometri di satu titik dan sifat-sifat yang digunakan dalam perhitungan limit dari Aktivitas Kelas dalam buku paket maupun LKS.
c. Peserta didik dan guru secara bersama-sama membahas jawaban soal-soal dari Aktivitas Kelas dalam buku paket maupun LKS.

📖 ***Konfirmasi***

Dalam kegiatan konfirmasi, Siswa:

a. Menyimpulkan tentang hal-hal yang belum diketahui
b. Menjelaskan tentang hal-hal yang belum diketahui.

Penutup

a. Peserta didik membuat rangkuman materi mengenai cara menghitung limit fungsi trigonometri di satu titik dan sifat-sifat yang digunakan dalam perhitungan limit.

b. Guru memberikan kesempatan kepada peserta didik untuk menanyakan terkait materi yang telah diajarkan.

c. Peserta didik diberikan pekerjaan rumah (PR) berkaitan dengan materi mengenai cara menghitung limit fungsi trigonometri di satu titik dan menjelaskan sifat-sifat yang digunakan dalam perhitungan limit dari soal-soal Aktivitas Kelas dan Latihan yang belum terselesaikan di dalam kelas atau dari referensi lain.

E. Alat dan Sumber Belajar

Sumber :

- *Mind mapping*
- Buku Paket, yaitu Matematika untuk SMA/ MA Ringkasan Materi kelas X, XI, XII, karangan Ahmad Zaelani, dkk. hal 339
- Seribu Pena Matematika untuk SMA/MA Kelas XI, karangan Husein Tampomas, hal 324.
- Buku referensi lain.

Alat :

- Laptop
- LCD
- OHP

F. Penilaian

Teknik : tugas individu, ulangan harian.

Bentuk Instrumen : uraian singkat

Tentukan limit fungsi-fungsi trigonometri berikut ini:

a. $\lim_{x\to 0}\frac{\sin 5x}{\sin 3x} = ...$

b. $\lim_{x\to 0}\frac{x.\tan x}{1-\cos 2x} = ...$

Jawaban

a. $\lim_{x\to 0}\frac{\sin 5x}{\sin 3x} = ...$

$= \lim_{x\to 0}\frac{\sin 5x}{5x}.5x.\frac{3x}{\sin 3x}.\frac{1}{3x}$

$=1.5x.1.\frac{1}{3x}$

$=\frac{5}{3}$

b. $\lim_{x\to 0}\frac{x.\tan x}{1-\cos 2x} = ...$

$= \lim_{x\to 0}\frac{x.\tan x}{1-(1-2\sin^2 x)}$

$= \lim_{x\to 0}\frac{x.\tan x}{2\sin^2 x}$

$= \frac{1}{2}\lim_{x\to 0}\frac{x^2}{\sin^2 x}.\frac{\tan x}{x}.$

$= \frac{1}{2}.1.1$

$= \frac{1}{2}$

Mengetahui
Guru Mata Pelajaran

Yanto Sugianto, S.Pd, M.Pd
NIP. 19620707 1989011001

Cirebon, April 2013
Peneliti

Sudianto
NIM. 59451098

RENCANA PELAKSANAAN PEMBELAJARAN

(RPP)

Nama Sekolah	:	SMAN 5 Kota Cirebon
Mata Pelajaran	:	Matematika
Kelas / Program	:	XI / IPA 4
Semester	:	Genap
Pertemuan ke-	:	5

Standar Kompetensi : 6. Menggunakan konsep limit fungsi dan turunan fungsi dalam pemecahan masalah.

Kompetensi Dasar : 6.1. Menjelaskan secara intuitif arti limit fungsi di suatu titik dan di takhingga dan menggunakan sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri.

Alokasi Waktu : 2 x 45 menit (1 pertemuan).

A. Tujuan Pembelajaran

a. Peserta didik dapat menggunakan limit dalam mencari gais singgung suatu kurva dan laju perubahan suatu fungsi dengan benar.
b. Peserta didik dapat menyelidiki kekontinuan suatu fungsi dengan benar.

❽ Karakter siswa yang diharapkan :

- *Rasa ingin tahu, Mandiri, Kreatif, Kerja keras.*

❽ Kewirausahaan / Ekonomi Kreatif :

- *Berorientasi tugas dan hasil, Percaya diri,Keorisinilan.*

B. Materi Ajar

a. Penggunaan limit

b. Kekontinuan fungsi

C. Metode Pembelajaran

Ceramah, *Mind mapping*, Tanya jawab, Diskusi kelompok.

D. Langkah-langkah Kegiatan

Pendahuluan

Apersepsi : Membahas PR dan mengingat kembali materi mengenai cara menghitung limit fungsi aljabar dan trigonometri di suatu titik dan tak hingga serta sifat-sifat yang digunakan dalam perhitungan limit.

Kegiatan Inti :

- ***Eksplorasi***

Dalam kegiatan eksplorasi :

a. Peserta didik diberikan stimulus berupa pemberian materi oleh guru dengan melihat *mind mapping* mengenai penggunaan limit serta kekontinuan dan diskontinuan (pengayaan), kemudian antara peserta didik dan guru mendiskusikan materi tersebut

b. Peserta didik mengkomunikasikan secara lisan atau mempresentasikan penggunaan limit serta kekontinuan dan diskontinuan.

- ***Elaborasi***

Dalam kegiatan elaborasi,

a. Peserta didik mengerjakan beberapa soal mengenai penggunaan limit serta kekontinuan dan diskontinuan dari Aktivitas Kelas dalam buku paket .

b. Peserta didik dan guru secara bersama-sama membahas jawaban soal-soal dari Aktivitas Kelas dalam buku paket.

c. Peserta didik mengerjakan soal-soal Latihan mengenai penggunaan limit serta kekontinuan dan diskontinuan dalam buku paket.

🕮 ***Konfirmasi***

Dalam kegiatan konfirmasi, Siswa:

a. Menyimpulkan tentang hal-hal yang belum diketahui
b. Menjelaskan tentang hal-hal yang belum diketahui.

Penutup

a. Peserta didik membuat rangkuman dari materi mengenai penggunaan limit serta kekontinuan dan diskontinuan.
b. Peserta didik dan guru melakukan refleksi.
c. Peserta didik diberikan pekerjaan rumah (PR) berkaitan dengan materi mengenai penggunaan limit serta kekontinuan dan diskontinuan dari soal-soal Aktivitas Kelas dan Latihan yang belum terselesaikan di dalam kelas atau dari referensi lain.

E. Alat dan Sumber Belajar

Sumber :

- *Mind mapping*
- Buku Paket, yaitu Matematika untuk SMA/ MA Ringkasan Materi kelas X, XI, XII, karangan Ahmad Zaelani, dkk. hal 345
- Seribu Pena Matematika untuk SMA/MA Kelas XI, karangan Husein Tampomas, hal 315. Erlangga
- Buku referensi lain.

Alat :

- Laptop
- LCD
- OHP

F. Penilaian

Teknik : tugas individu, ulangan harian.

Bentuk Instrumen : uraian singkat

Contoh instrumen

1. Gambarkan garis singgung kurva $f(x) = x^2 - 4x + 3$ di $x = -1,\ 0,\ \frac{1}{2}$.
2. Selidiki kekontinuan fungsi-fungsi berikut:
   a. $f(x) = \frac{x^2 - 4}{x - 2}$ di $x = 2$

Mengetahui
Guru Mata Pelajaran

Yanto Sugianto, S.Pd, M.Pd
NIP. 19620707 1989011001

Cirebon, April 2013
Peneliti

Sudianto
NIM. 59451098

APPENDIX C

Questionnaire Evaluation of Learning Media

C.1. Design of Learning Media Using Adobe Flash CS3

C.2. Evaluation Learning Media of Adobe Flash CS3 to the Material & Media Experts

C.3. Calculations Evaluation Media of Adobe Flash CS3

C.4. Evaluation Learning Media of iMindMap to the Material & Media Experts

C.5. Calculations Evaluation Media of iMindMap

Appendix C.1 Design of Learning Media Using Adobe Flash CS3

Scene	Layer	Frame	Information
Main menu	1. Background	1	-
	2. Title	1	-
	3. Author	1	-
	4. Enter button	1	-
Introduction	1. Background	1	Continue
	2. Home button	1	Continue
	3. SK-KD button	1	Continue
	4. Indicators button	1	Continue
	5. Material button	1	Continue
	6. Author button	1	Continue
Material	1. Background	1	Continue
	2. Next button	1	Continue
	3. Previous button	1	Continue
	4. Home button	1	Continue
	5. Sub-material button	1	Continue
	6. Definition of limit button	1	Continue
	7. Algebraic function button	1	Continue
	8. Substitution button	1	Continue
	9. Factorization button	1	Continue
	10. Conjugate button	1	Continue
	11. Dividing the highest exponent button	1	Continue
	12. Theorem of limit Button	1	Continue
	13. Trigonometric function button	1	Continue
	14. L' hospital button	1	Continue
Exercises	1. Discussion button	1	Continue
	2. Back button	1	Continue

Author	1. Background	1	Continue
	2. Identity Authors	1	Continue
	3. Back button	1	Continue

Appendix C.2 Evaluation Media of Adobe Flash CS3 to the *Material Expert*

ANGKET (DAFTAR CEK)

EVALUASI MEDIA PEMBELAJARAN MENGGUNAKAN

ADOBE FLASH CS3

Kepada Yth.,

Ibu Nurma Izzati, M.Pd

Dosen **Ahli Materi**

Di

IAIN Syekh Nurjati Cirebon

Assalamu'alaikum Wr. Wb.

Dengan hormat,

Dalam rangka penulisan skripsi pada Jurusan Tadris Matematika di IAIN Syekh Nurjati Cirebon, kami sedang melakukan penelitian pengembangan tentang *"The Comparative Study Between The Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function (Experimental Study at Science Eleventh Class of SMAN 5 Kota Cirebon)".*

Berkaitan dengan pengembangan tersebut, kami mohon kesediaan Ibu berkenaan memberikan penilaian dan masukan tentang aspek-aspek yang terkait dengan pengembangan media tersebut di atas, dengan mengisi angket (daftar cek) yang terlampir.

Atas perkenaan dan segala bantuan Ibu, kami sampaikan terima kasih.

Wassalamu'alaikum Wr. Wb.

Cirebon, 18 Maret 2013

Hormat Saya,

Sudianto
NIM. 59451098

Kisi-kisi Evaluasi Media oleh Ahli Materi

Variabel Penelitian	Indikator/ Aspek	Deskriptor/ Kriteria	Sumber Informasi	Jenis Instrumen yang digunakan
Pengembangan media pembelajaran dengan *Adobe Flash CS 3*	Kualitas isi dan tujuan	▪ Kesesuaian tujuan pembelajaran dengan kurikulum ▪ Kejelasan petunjuk belajar ▪ Ketetapan urutan materi tepat ▪ Kesesuaian materi dengan tujuan pembelajaran kurikulum ▪ Kejelasan uraian materi ▪ Kedalaman materi	Ahli Materi	Angket (Checklist)
	Kualitas Pembelajaran	▪ Pemberian latihan ▪ Pemberian umpan balik terhadap motivasi belajar ▪ Kesesuaian soal-soal test dengan tujuan pembelajaran ▪ Kejelasan istilah ▪ Kemudahan pemahaman penggunaan bahasa		

LEMBAR EVALUASI AHLI MATERI

Petunjuk :

- ❖ Lembar Evaluasi ini di isi oleh ahli materi bidang studi.
- ❖ Evaluasi ini terdiri dari aspek Kualitas isi dan tujuan serta Kualitas pembelajaran
- ❖ Penilaian dengan rentang mulai dari sangat bagus sampai dengan sangat kurang. Dengan memberikan tanda check (V) pada kolom yang tersedia.

SB = Sangat Bagus
B = Bagus
C = Cukup
K = Kurang
SK = Sangat Kurang

A. Aspek Kualitas isi dan Tujuan

No	Aspek Kualitas Isi dan Tujuan	SB	B	C	K	SK
1	Kesesuaian tujuan pembelajaran dengan kurikulum			✓		
2	Kejelasan petunjuk belajar		✓			
3	Ketetapan urutan materi tepat		✓			
4	Kesesuaian materi dengan tujuan pembelajaran kurikulum		✓			
5	Kejelasan uraian materi		✓			
6	Kedalaman materi		✓			

B. Aspek Kualitas Pembelajaran

No	Aspek Kualitas Isi dan Tujuan	SB	B	C	K	SK
1	Pemberian latihan		✓			
2	Pemberian umpan balik terhadap motivasi belajar		✓			

3	Kesesuaian soal-soal test dengan tujuan pembelajaran	✓				
4	Kejelasan istilah		✓			
5	Kemudahan pemahaman penggunaan bahasa.	✓				

C. Kesimpulan

Kelebihan :……...

Kekurangan :……...

Rekomendasi :……...

Cirebon,

Evaluator Ahli Materi

Nurma Izzati, M.Pd

NIP.19841223 201101 2 011

ANGKET (DAFTAR CEK)

EVALUASI MEDIA PEMBELAJARAN MENGGUNAKAN

ADOBE FLASH CS3

Kepada Yth.,

Bapak Arif Muchyidin, M.Si

Dosen **Ahli Materi**

Di

IAIN Syekh Nurjati Cirebon

Assalamu'alaikum Wr. Wb.

Dengan hormat,

Dalam rangka penulisan skripsi pada Jurusan Tadris Matematika di IAIN Syekh Nurjati Cirebon, kami sedang melakukan penelitian pengembangan tentang *"The Comparative Study Between The Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function (Experimental Study at Science Eleventh Class of SMAN 5 Kota Cirebon)".*

Berkaitan dengan pengembangan tersebut, kami mohon kesediaan Bapak berkenaan memberikan penilaian dan masukan tentang aspek-aspek yang terkait dengan pengembangan media tersebut di atas, dengan mengisi angket (daftar cek) yang terlampir.

Atas perkenaan dan segala bantuan Bapak, kami sampaikan terima kasih.

Wassalamu'alaikum Wr. Wb.

Cirebon, 18 Maret 2013

Hormat Saya,

Sudianto

NIM. 59451098

Kisi-kisi Evaluasi Media oleh Ahli Materi

Variabel Penelitian	Indikator/ Aspek	Deskriptor/ Kriteria	Sumber Informasi	Jenis Instrumen yang digunakan
Pengembangan media pembelajaran dengan *Adobe Flash CS 3*	Kualitas isi dan tujuan	▪ Kesesuaian tujuan pembelajaran dengan kurikulum ▪ Kejelasan petunjuk belajar ▪ Ketetapan urutan materi tepat ▪ Kesesuaian materi dengan tujuan pembelajaran kurikulum ▪ Kejelasan uraian materi ▪ Kedalaman materi	Ahli Materi	Angket (Checklist)
	Kualitas Pembelajaran	▪ Pemberian latihan ▪ Pemberian umpan balik terhadap motivasi belajar ▪ Kesesuaian soal-soal test dengan tujuan pembelajaran ▪ Kejelasan istilah ▪ Kemudahan pemahaman penggunaan bahasa		

LEMBAR EVALUASI AHLI MATERI

Petunjuk :

- ❖ Lembar Evaluasi ini di isi oleh ahli materi bidang studi.
- ❖ Evaluasi ini terdiri dari aspek Kualitas isi dan tujuan serta Kualitas pembelajaran
- ❖ Penilaian dengan rentang mulai dari sangat bagus sampai dengan sangat kurang. Dengan memberikan tanda check (V) pada kolom yang tersedia.

SB = Sangat Bagus
B = Bagus
C = Cukup
K = Kurang
SK = Sangat Kurang

A. Aspek Kualitas isi dan Tujuan

No	Aspek Kualitas Isi dan Tujuan	SB	B	C	K	SK
1	Kesesuaian tujuan pembelajaran dengan kurikulum		✓			
2	Kejelasan petunjuk belajar		✓			
3	Ketetapan urutan materi tepat		✓			
4	Kesesuaian materi dengan tujuan pembelajaran kurikulum		✓			
5	Kejelasan uraian materi		✓			
6	Kedalaman materi			✓		

B. Aspek Kualitas Pembelajaran

No	Aspek Kualitas Isi dan Tujuan	SB	B	C	K	SK
1	Pemberian latihan		✓			
2	Pemberian umpan balik terhadap motivasi belajar		✓			
3	Kesesuaian soal-soal test dengan tujuan pembelajaran		✓			

4	Kejelasan istilah		✓			
5	Kemudahan pemahaman penggunaan bahasa.		✓			

C. Kesimpulan

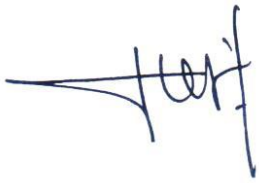
Kelebihan :……...

Kekurangan :……...

Rekomendasi :……...

Cirebon,

Evaluator Ahli Materi



Arif Muchyidin, M.Si

NIP.19830806 201101 1 009

Appendix C.2 Evaluation Media of Adobe Flash CS3 to the *Media Experts*

ANGKET (DAFTAR CEK)

EVALUASI MEDIA PEMBELAJARAN MENGGUNAKAN

ADOBE FLASH CS3

Kepada Yth.,

Bapak Darwan, M.Kom

Dosen **Ahli Media**

Di

IAIN Syekh Nurjati Cirebon

Assalamu'alaikum Wr. Wb.

Dengan hormat,

Dalam rangka penulisan skripsi pada Jurusan Tadris Matematika di IAIN Syekh Nurjati Cirebon, kami sedang melakukan penelitian pengembangan tentang " *The Comparative Study Between The Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function (Experimental Study at Science Eleventh Class of SMAN 5 Kota Cirebon)".*

Berkaitan dengan pengembangan tersebut, kami mohon kesediaan Bapak berkenaan memberikan penilaian dan masukan tentang aspek-aspek yang terkait dengan pengembangan media tersebut di atas, dengan mengisi angket (daftar cek) yang terlampir.

Atas perkenaan dan segala bantuan Bapak, kami sampaikan terima kasih.

Wassalamu'alaikum Wr. Wb.

Cirebon, 18 Maret 2013

Hormat Saya,

Sudianto

NIM. 59451098

Appendix C.6 Lattice Evaluation of Media Expert

Kisi-kisi Evaluasi Media oleh Ahli Media

Variabel Penelitian	Indikator/ Aspek	Deskriptor/ Kriteria	Sumber Informasi	Jenis Instrumen yang digunakan
Pengembangan media pembelajaran dengan *Adobe Flash CS 3*	Rekayasa Perangkat Lunak	▪ Efektif dan efisien ▪ *Reliabel* (handal) ▪ *Maintainable* (dapat dikelolah dengan mudah) ▪ *Usabilitas* (mudah digunakan dan sederhana) ▪ Ketepatan pemilihan jenis aplikasi ▪ *Kompabilitas* (dapat dijalankan diberbagai hardware dan software yang ada) ▪ *Reusable* (sebagian atau keseluruhan program media pembelajaran dapat dimanfaatkan kembali).	Ahli Media	Angket (*Checklist*)

	Desain Pembelajaran	▪ Kejelasan tujuan pembelajaran ▪ Relevansi tujuan pembelajaran dengan kurikulum ▪ Cakupan dan kedalaman tujuan pembelajaran ▪ Ketepatan penggunaan strategi pembelajaran ▪ Interaktifitas pemberian motivasi belajar ▪ Kontekstualitas dan aktualitas ▪ Kelengkapan dan kualitas bahan bantuan belajar ▪ Kesesuain materi dengan tujuan pembelajaran ▪ Kedalaman materi ▪ Kemudahan untuk dipahami ▪ Sistematis, runut, alur logika jelas ▪ Kejelasan uraian, pembahasan, contoh, simulasi dan latihan ▪ Konsistensi evaluasi dengan tujuan pembelajaran ▪ Ketepatan dan ketetapan alat evalusi ▪ Pemberian umpan balik terhadap hasil evaluasi		

	Komunikasi Visual	▪ Komunikatif ▪ Kreatif dalam ide ▪ Sederhana dan memikat ▪ Audio (narasi, *sound effect, backsound,* musik) ▪ *Development Visual* (*Layout Design, typography*, warna) ▪ Media bergerak (animasi, *movie*) ▪ *Layout interactive* (tombol)		

LEMBAR EVALUASI AHLI MEDIA

Petunjuk :

- Lembar Evaluasi ini di isi oleh ahli media bidang studi.
- Evaluasi ini terdiri dari aspek Kualitas isi dan tujuan serta Kualitas pembelajaran
- Penilaian dengan rentang mulai dari sangat bagus sampai dengan sangat kurang. Dengan memberikan tanda check (V) pada kolom yang tersedia.

SB = Sangat Bagus
B = Bagus
C = Cukup
K = Kurang
SK = Sangat Kurang

A. Aspek Rekayasa Perangkat Lunak

No	Aspek Rekayasa Perangkat Lunak	SB	B	C	K	SK
1	Efektif dan efisien		✓			
2	Reliabel (handal)	✓				
3	*Maintainable* (dapat dikelolah dengan mudah)		✓			
4	*Usabilitas* (mudah digunakan dan sederhana)	✓				
5	Ketepatan pemilihan jenis aplikasi		✓			
6	Kompabilitas (dapat dijalankan diberbagai *hardware* dan *software* yang ada)		✓			
7	*Reusable* (sebagian atau keseluruhan program media pembelajaran dapat dimanfaatkan kembali)		✓			

B. Aspek Desain Pembelajaran

No	Aspek Desain Pembelajaran	SB	B	C	K	SK
1	Kejelasan tujuan pembelajaran	✓				
2	Relevansi tujuan pembelajaran dengan kurikulum	✓				
3	Cakupan dan kedalaman tujuan pembelajaran		✓			
4	Ketepatan penggunaan strategi pembelajaran	✓				
5	Interaktifitas pemberian motivasi belajar		✓			
6	Kontekstualitas dan aktualitas		✓			
7	Kelengkapan dan kualitas bahan bantuan belajar		✓			
8	Kesesuain materi dengan tujuan pembelajaran	✓				

9	Kedalaman materi		✓			
10	Kemudahan untuk dipahami	✓				
11	Sistematis, runut, alur logika jelas	✓				
12	Kejelasan uraian, pembahasan, contoh, simulasi dan latihan		✓			
13	Konsistensi evaluasi dengan tujuan pembelajaran		✓			
14	Ketepatan dan ketetapan alat evalusi Pemberian umpan balik terhadap hasil evaluasi		✓			

C. Aspek Komunikasi Visual

No	**Aspek Komunikasi Visual**	**SB**	**B**	**C**	**K**	**SK**
1	Komunikatif	✓				
2	Kreatif dalam ide		✓			
3	Sederhana dan memikat		✓			
4	Audio (narasi, *sound effect, backsound,* musik)		✓			
5	*Development Visual* (*Layout Design, typography*, warna)		✓			
6	Media bergerak (animasi, *movie*)	✓				
7	*Layout interactive* (tombol)		✓			

D. Kesimpulan

Kelebihan :……...

Kekurangan :……**...**

Rekomendasi :……...

Cirebon,

Evaluator Ahli Media

Darwan, M.Kom

NIP.19810910 200801 1 010

ANGKET (DAFTAR CEK)

EVALUASI MEDIA PEMBELAJARAN MENGGUNAKAN

ADOBE FLASH CS3

Kepada Yth.,

Bapak Hendri Raharjo, M.Kom

Dosen **Ahli Media**

Di

IAIN Syekh Nurjati Cirebon

Assalamu'alaikum Wr. Wb.

Dengan hormat,

Dalam rangka penulisan skripsi pada Jurusan Tadris Matematika di IAIN Syekh Nurjati Cirebon, kami sedang melakukan penelitian pengembangan tentang " *The Comparative Study Between The Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function (Experimental Study at Science Eleventh Class of SMAN 5 Kota Cirebon)".*

Berkaitan dengan pengembangan tersebut, kami mohon kesediaan Bapak berkenaan memberikan penilaian dan masukan tentang aspek-aspek yang terkait dengan pengembangan media tersebut di atas, dengan mengisi angket (daftar cek) yang terlampir.

Atas perkenaan dan segala bantuan Bapak, kami sampaikan terima kasih.

Wassalamu'alaikum Wr. Wb.

Cirebon, 18 Maret 2013

Hormat Saya,

Sudianto

NIM. 59451098

Kisi-kisi Evaluasi Media oleh Ahli Media

Variabel Penelitian	Indikator/ Aspek	Deskriptor/ Kriteria	Sumber Informasi	Jenis Instrumen yang digunakan
Pengembangan media pembelajaran dengan *Adobe Flash CS 3*	Rekayasa Perangkat Lunak	▪ Efektif dan efisien ▪ *Reliabel* (handal) ▪ *Maintainable* (dapat dikelolah dengan mudah) ▪ *Usabilitas* (mudah digunakan dan sederhana) ▪ Ketepatan pemilihan jenis aplikasi ▪ *Kompabilitas* (dapat dijalankan diberbagai hardware dan software yang ada) ▪ *Reusable* (sebagian atau keseluruhan program media pembelajaran dapat dimanfaatkan kembali)	Ahli Media	Angket (*Checklist*)

	Desain Pembelajaran	▪ Kejelasan tujuan pembelajaran ▪ Relevansi tujuan pembelajaran dengan kurikulum ▪ Cakupan dan kedalaman tujuan pembelajaran ▪ Ketepatan penggunaan strategi pembelajaran ▪ Interaktifitas pemberian motivasi belajar ▪ Kontekstualitas dan aktualitas ▪ Kelengkapan dan kualitas bahan bantuan belajar ▪ Kesesuain materi dengan tujuan pembelajaran ▪ Kedalaman materi ▪ Kemudahan untuk dipahami ▪ Sistematis, runut, alur logika jelas ▪ Kejelasan uraian, pembahasan, contoh, simulasi dan latihan ▪ Konsistensi evaluasi dengan tujuan pembelajaran ▪ Ketepatan dan ketetapan alat evalusi ▪ Pemberian umpan balik terhadap hasil evaluasi		

	Komunikasi Visual	▪ Komunikatif ▪ Kreatif dalam ide ▪ Sederhana dan memikat ▪ Audio (narasi, *sound effect*, *backsound*, musik) ▪ *Development Visual* (*Layout Design*, *typography*, warna) ▪ Media bergerak (animasi, *movie*) ▪ *Layout interactive* (tombol)		

LEMBAR EVALUASI AHLI MEDIA

Petunjuk :

- Lembar Evaluasi ini di isi oleh ahli media bidang studi.
- Evaluasi ini terdiri dari aspek Kualitas isi dan tujuan serta Kualitas pembelajaran
- Penilaian dengan rentang mulai dari sangat bagus sampai dengan sangat kurang. Dengan memberikan tanda check (V) pada kolom yang tersedia.

SB = Sangat Bagus
B = Bagus
C = Cukup
K = Kurang
SK = Sangat Kurang

A. Aspek Rekayasa Perangkat Lunak

No	Aspek Rekayasa Perangkat Lunak	SB	B	C	K	SK
1	Efektif dan efisien	✓				
2	Reliabel (handal)		✓			
3	*Maintainable* (dapat dikelolah dengan mudah)	✓				
4	*Usabilitas* (mudah digunakan dan sederhana)	✓				
5	Ketepatan pemilihan jenis aplikasi		✓			
6	Kompabilitas (dapat dijalankan diberbagai *hardware* dan *software* yang ada)	✓				
7	*Reusable* (sebagian atau keseluruhan program media pembelajaran dapat dimanfaatkan kembali)	✓				

B. Aspek Desain Pembelajaran

No	Aspek Desain Pembelajaran	SB	B	C	K	SK
1	Kejelasan tujuan pembelajaran	✓				
2	Relevansi tujuan pembelajaran dengan kurikulum		✓			
3	Cakupan dan kedalaman tujuan pembelajaran		✓			
4	Ketepatan penggunaan strategi pembelajaran	✓				
5	Interaktifitas pemberian motivasi belajar	✓				
6	Kontekstualitas dan aktualitas	✓				

7	Kelengkapan dan kualitas bahan bantuan belajar	✓				
8	Kesesuain materi dengan tujuan pembelajaran	✓				
9	Kedalaman materi		✓			
10	Kemudahan untuk dipahami	✓				
11	Sistematis, runut, alur logika jelas	✓				
12	Kejelasan uraian, pembahasan, contoh, simulasi dan latihan	✓				
13	Konsistensi evaluasi dengan tujuan pembelajaran	✓				
14	Ketepatan dan ketetapan alat evalusi Pemberian umpan balik terhadap hasil evaluasi		✓			

C. Aspek Komunikasi Visual

No	**Aspek Komunikasi Visual**	**SB**	**B**	**C**	**K**	**SK**
1	Komunikatif	✓				
2	Kreatif dalam ide	✓				
3	Sederhana dan memikat	✓				
4	Audio (narasi, *sound effect*, *backsound*, musik)	✓				
5	*Development Visual* (*Layout Design, typography*, warna)		✓			
6	Media bergerak (animasi, *movie*)	✓				
7	*Layout interactive* (tombol)		✓			

Kesimpulan

Kelebihan :……...

Kekurangan :……...

Rekomendasi :……...

Cirebon,

Evaluator Ahli Media

Hendri Raharjo, M.Kom

Appendix C.3 Calculations Evaluation of *Material Expert* Using Adobe Flash CS3

A. Aspek Kualitas Isi dan Tujuan

No	Aspek Kualitas Isi dan Tujuan	Ahli Materi 1					Ahli Materi 2					SKOR
		SB	B	C	K	SK	SB	B	C	K	SK	
1	Kesesuaian tujuan pembelajaran dengan kurikulum	0	4	0	0	0	0	0	3	0	0	7
2	Kejelasan petunjuk belajar	0	4	0	0	0	0	4	0	0	0	8
3	Ketetapan urutan materi tepat	0	4	0	0	0	0	4	0	0	0	8
4	Kesesuaian materi dengan tujuan pembelajaran kurikulum	0	4	0	0	0	0	4	0	0	0	8
5	Kejelasan uraian materi	0	4	0	0	0	0	4	0	0	0	8
6	Kedalaman materi	0	0	3	0	0	0	4	0	0	0	7
Jumlah Total												**46**
Presentase = (46 / 60) x 100 %												**76,7 %**

B. Aspek Kualitas Pembelajaran

No	Aspek Kualitas Pembelajaran	Ahli Materi 1					Ahli Materi 2					SKOR
		SB	B	C	K	SK	SB	B	C	K	SK	
1	Pemberian latihan	0	4	0	0	0	0	4	0	0	0	8
2	Pemberian umpan balik terhadap motivasi belajar	0	4	0	0	0	0	4	0	0	0	8
3	Kesesuaian soal-soal test dengan tujuan pembelajaran	0	4	0	0	0	5	0	0	0	0	9
4	Kejelasan istilah	0	4	0	0	0	0	4	0	0	0	8
5	Kemudahan pemahaman penggunaan bahasa.	0	4	0	0	0	5	0	0	0	0	9
Jumlah Total												**42**
Presentase = (42 / 50) x 100 %												**84 %**

Appendix C.3 Calculations Evaluation of *Media Expert* Using Adobe Flash CS3

A. Aspek Rekayasa Perangkat lunak

No	Aspek Rekayasa Perangkat Lunak	Ahli Media 1					Ahli Media 2					SKOR
		SB	B	C	K	SK	SB	B	C	K	SK	
1	Efektif dan efisien	0	4	0	0	0	5	0	0	0	0	9
2	Reliabel (handal)	5	0	0	0	0	0	4	0	0	0	9
3	Maintainable (dapat dikelolah dengan mudah)	0	4	0	0	0	5	0	0	0	0	9
4	Usabilitas (mudah digunakan dan sederhana)	5	0	0	0	0	5	0	0	0	0	10
5	Ketepatan pemilihan jenis aplikasi	0	4	0	0	0	0	4	0	0	0	8
6	Kompabilitas (dapat dijalankan diberbagai hardware dan software yang ada)	0	4	0	0	0	5	0	0	0	0	9
7	Reusable (sebagian atau keseluruhan program media pembelajaran dapat dimanfaatkan kembali)	0	4	0	0	0	5	0	0	0	0	9
Jumlah Total												**63**
Presentase = (63 / 70) x 100%												**90 %**

B. Aspek Desain Pembelajaran

No	Aspek DesainPembelajaran	Ahli Media 1					Ahli Media 2					SKOR
		SB	B	C	K	SK	SB	B	C	K	SK	
1	Kejelasan tujuan pembelajaran	5	0	0	0	0	5	0	0	0	0	10
2	Relevansi tujuan pembelajaran dengan kurikulum	5	0	0	0	0	0	4	0	0	0	9
3	Cakupan dan kedalaman tujuan pembelajaran	0	4	0	0	0	0	4	0	0	0	8
4	Ketepatan penggunaan strategi pembelajaran	5	0	0	0	0	5	0	0	0	0	10
5	Interaktifitas pemberian motivasi belajar	0	4	0	0	0	5	0	0	0	0	9

6	Kontekstualitas dan aktualitas	0	4	0	0	0	5	0	0	0	0	9
7	Kelengkapan dan kualitas bahan bantuan belajar	0	4	0	0	0	5	0	0	0	0	9
8	Kesesuain materi dengan tujuan pembelajaran	5	0	0	0	0	5	0	0	0	0	10
9	Kedalaman materi	0	4	0	0	0	0	4	0	0	0	8
10	Kemudahan untuk dipahami	5	0	0	0	0	5	0	0	0	0	10
11	Sistematis, runut, alur logika jelas	5	0	0	0	0	5	0	0	0	0	10
12	Kejelasan uraian, pembahasan, contoh, simulasi dan latihan	0	4	0	0	0	5	0	0	0	0	9
13	Konsistensi evaluasi dengan tujuan pembelajaran	0	4	0	0	0	5	0	0	0	0	9
14	Ketepatan dan ketetapan alat evalusi	0	4	0	0	0	0	4	0	0	0	8
Jumlah Total												**128**
Presentase = (128 / 140) x 100 %												**91, 4%**

C . Aspek Komunikasi Visual

No	**Aspek Komunikasi Visual**	**Ahli Media 1**					**Ahli Media 2**					**SKOR**
		SB	**B**	**C**	**K**	**SK**	**SB**	**B**	**C**	**K**	**SK**	
1	Komunikatif	5	0	0	0	0	5	0	0	0	0	10
2	Kreatif dalam ide	0	4	0	0	0	5	0	0	0	0	9
3	Sederhana dan memikat	0	4	0	0	0	5	0	0	0	0	9
4	Audio (narasi, sound effect, backsound, musik)	0	4	0	0	0	5	0	0	0	0	9
5	Development Visual (Layout Design, typography, warna)	0	4	0	0	0	0	4	0	0	0	8
6	Media bergerak (animasi, movie)	5	0	0	0	0	5	0	0	0	0	10
7	Layout interactive (tombol)	0	4	0	0	0	0	4	0	0	0	8
Jumlah Total												**63**
Presentase = (63 / 70) x 100 %												**90**

Appendix C.4 Evaluation Media of iMindMap to the *Material Expert*

ANGKET (DAFTAR CEK)

EVALUASI MEDIA PEMBELAJARAN MENGGUNAKAN

IMINDMAP

Kepada Yth.,

Bapak Reza Oktiana Akbar, M.Pd

Dosen **Ahli Materi**

Di

IAIN Syekh Nurjati Cirebon

Assalamu'alaikum Wr. Wb.

Dengan hormat,

Dalam rangka penulisan skripsi pada Jurusan Tadris Matematika di IAIN Syekh Nurjati Cirebon, kami sedang melakukan penelitian pengembangan tentang "*The Comparative Study Between The Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function (Experimental Study at Science Eleventh Class of SMAN 5 Kota Cirebon)".*

Berkaitan dengan pengembangan tersebut, kami mohon kesediaan Bapak berkenaan memberikan penilaian dan masukan tentang aspek-aspek yang terkait dengan pengembangan media tersebut di atas, dengan mengisi angket (daftar cek) yang terlampir. Atas perkenaan dan segala bantuan Bapak, kami sampaikan terima kasih.

Wassalamu'alaikum Wr. Wb.

Cirebon, 18 Maret 2013

Hormat Saya,

Sudianto
NIM. 59451098

Kisi-kisi Evaluasi Media oleh Ahli Materi

Variabel Penelitian	Indikator/ Aspek	Deskriptor/ Kriteria	Sumber Informasi	Jenis Instrumen yang digunakan
Pengembangan media pembelajaran dengan *iMindMap*	Kualitas isi dan tujuan	▪ Kesesuaian materi pembelajaran dengan kurikulum ▪ Fokus pada pokok bahasan tertentu ▪ Ketetapan urutan materi ▪ Menghubungkan bagian terpisah dari suatu informasi ▪ Materi singkat, padat dan mewakili secara keseluruhan. ▪ Kedalaman materi	Ahli Materi	Angket (Checklist)

LEMBAR EVALUASI AHLI MATERI

Petunjuk :

- ❖ Lembar Evaluasi ini di isi oleh ahli materi bidang studi.
- ❖ Evaluasi ini terdiri dari aspek Kualitas isi dan tujuan serta Kualitas pembelajaran
- ❖ Penilaian dengan rentang mulai dari sangat bagus sampai dengan sangat kurang. Dengan memberikan tanda check (V) pada kolom yang tersedia.

SB = Sangat Bagus K = Kurang

B = Bagus SK = Sangat Kurang

C = Cukup

A. Aspek Kualitas isi dan Tujuan

No	Aspek Kualitas Isi dan Tujuan	SB	B	C	K	SK
1	Kesesuaian materi pembelajaran dengan kurikulum	✓				
2	Fokus pada pokok bahasan tertentu		✓			
3	Ketetapan urutan materi		✓			
4	Menghubungkan bagian terpisah dari suatu informasi		✓			
5	Materi singkat, padat dan mewakili secara keseluruhan.	✓				
6	Kedalaman materi			✓		

B. Kesimpulan

Kelebihan :……

Kekurangan :……..

Rekomendasi :…….....

Cirebon,

Evaluator Ahli Materi

Reza Oktiana Akbar, M.Pd

NIP. 19811022 200501 1 001

Appendix C.4 Evaluation Media of iMindMap to the *Media Expert*

ANGKET (DAFTAR CEK)
EVALUASI MEDIA PEMBELAJARAN MENGGUNAKAN IMINDMAP

Kepada Yth.,

Pak Saluky, M.Kom

Dosen **Ahli Media**

Di

IAIN Syekh Nurjati Cirebon

Assalamu'alaikum Wr. Wb.

Dengan hormat,

Dalam rangka penulisan skripsi pada Jurusan Tadris Matematika di IAIN Syekh Nurjati Cirebon, kami sedang melakukan penelitian pengembangan tentang *"The Comparative Study Between The Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function (Experimental Study at Science Eleventh Class of SMAN 5 Kota Cirebon)"*.

Berkaitan dengan pengembangan tersebut, kami mohon kesediaan Bapak berkenaan memberikan penilaian dan masukan tentang aspek-aspek yang terkait dengan pengembangan media tersebut di atas, dengan mengisi angket (daftar cek) yang terlampir.

Atas perkenaan dan segala bantuan bapak, kami sampaikan terima kasih.

Wassalamu'alaikum Wr. Wb.

Cirebon, 18 Maret 2013

Hormat Saya,

Sudianto
NIM. 59451098

Kisi-kisi Evaluasi Media oleh Ahli Media

Variabel Penelitian	Indikator/ Aspek	Deskriptor/ Kriteria	Sumber Informasi	Jenis Instrumen yang digunakan
Pengembangan media pembelajaran dengan *iMindMap*	Rekayasa Perangkat Lunak	▪ Efektif dan efisien ▪ *Reliabel* (handal) ▪ *Maintainable* (dapat dikelolah dengan mudah) ▪ *Usabilitas* (mudah digunakan dan sederhana) ▪ Ketepatan pemilihan jenis aplikasi ▪ *Kompabilitas* (dapat dijalankan diberbagai hardware dan software yang ada) ▪ *Reusable* (sebagian atau keseluruhan program media pembelajaran dapat dimanfaatkan kembali)	Ahli Media	Angket (*Checklist*)
	Komunikasi Visual	• Komunikatif • Kreatif dalam ide • Sederhana dan memikat • Audio (narasi, sound effect, backsound, musik) • Development Visual (Layout Design, typography, warna dan background) • Media bergerak (animasi, movie) • Layout interactive (tombol)		

LEMBAR EVALUASI AHLI MEDIA

Petunjuk :

- Lembar Evaluasi ini di isi oleh ahli media bidang studi.
- Evaluasi ini terdiri dari aspek Kualitas isi dan tujuan serta Kualitas pembelajaran
- Penilaian dengan rentang mulai dari sangat bagus sampai dengan sangat kurang. Dengan memberikan tanda check (V) pada kolom yang tersedia.

SB = Sangat Bagus
B = Bagus
C = Cukup
K = Kurang
SK = Sangat Kurang

A. Aspek Rekayasa Perangkat Lunak

No	Aspek Rekayasa Perangkat Lunak	SB	B	C	K	SK
1	Efektif dan efisien		✓			
2	Reliabel (handal)		✓			
3	*Maintainable* (dapat dikelolah dengan mudah)	✓				
4	*Usabilitas* (mudah digunakan dan sederhana)	✓				
5	Ketepatan pemilihan jenis aplikasi	✓				
6	Kompabilitas (dapat dijalankan diberbagai *hardware* dan *software* yang ada)	✓				
7	*Reusable* (sebagian atau keseluruhan program media pembelajaran dapat dimanfaatkan kembali)		✓			

B. Aspek Komunikasi Visual

No	Aspek Komunikasi Visual	SB	B	C	K	SK
1	Komunikatif	✓				
2	Kreatif dalam ide	✓				
3	Sederhana dan memikat	✓				

C. Kesimpulan

Kelebihan :……

Kekurangan :……..

Rekomendasi :…….....

Cirebon,

Evaluator Ahli Materi

Saluky, M.Kom

NIP. 19780525 201101 1 006

Appendix C.5 Calculations Evaluation of *Material Expert* Using iMindMap

A. Aspek Kualitas Isi dan Tujuan

No	Aspek Kualitas Isi dan Tujuan	Ahli Materi					SKOR
		SB	B	C	K	SK	
1	Kesesuaian tujuan pembelajaran dengan kurikulum	5	0	0	0	0	5
2	Fokus pada pokok bahasan tertentu	0	4	0	0	0	4
3	Ketetapan urutan materi	0	4	0	0	0	4
4	Menghubungkan bagian terpisah dari suatu informasi	0	4	0	0	0	4
5	Materi singkat, padat dan mewakili secara keseluruhan	5	0	0	0	0	5
6	Kedalaman materi	0	0	3	0	0	3
Jumlah Total							**25**
Presentase = (25 / 30) x 100 %							**83.3 %**

Appendix C.5 Calculations Evaluation of *Media Expert* Using iMindMap

A. Aspek Rekayasa Perangkat lunak

No	Aspek Rekayasa Perangkat Lunak	Ahli Media					SKOR
		SB	B	C	K	SK	
1	Efektif dan efisien	0	4	0	0	0	4
2	Reliabel (handal)	0	4	0	0	0	4
3	Maintainable (dapat dikelolah dengan mudah)	5	0	0	0	0	5
4	Usabilitas (mudah digunakan dan sederhana)	5	0	0	0	0	5
5	Ketepatan pemilihan jenis aplikasi	5	0	0	0	0	5
6	Kompabilitas (dapat dijalankan diberbagai hardware dan software yang ada)	5	0	0	0	0	5

7	Reusable (sebagian atau keseluruhan program media pembelajaran dapat dimanfaatkan kembali)	0	4	0	0	0	4
Jumlah Total							**32**
Presentase = (32 / 35) x 100%							**91.4 %**

B. Aspek Komunikasi Visual

No	Aspek Komunikasi Visual	Ahli Media 1					SKOR
		SB	B	C	K	SK	
1	Komunikatif	5	0	0	0	0	5
2	Kreatif dalam ide	5	0	0	0	0	5
3	Sederhana dan memikat	5	0	0	0	0	5
4	Audio (narasi, sound effect, backsound, musik)	0	4	0	0	0	4
5	Development Visual (Layout Design, typography, warna)	0	4	0	0	0	4
6	Media bergerak (animasi, movie)	0	4	0	0	0	4
7	Layout interactive (tombol)	0	4	0	0	0	4
Jumlah Total							**31**
Presentase = (31 / 35) x 100 %							**88.5 %**

APPENDIX D

Analysis Instrument Test

D.1 Students' Data on Instruments Testing Result

D.2 Sheet of Validation Expert 1 & 2

D.3 Validity Test

D.4 Reliability Test

D.5 Difficulty Index

D.6 The Differentiator

D.7 Recapitulation Instrument Test

Appendix D.1 Students' Data on Instruments Testing Result class XI IPA 2

R	No. Item Soal															SKOR
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
U-10	6	6	6	6	6	8	6	6	8	6	3	4	6	7	7	91
U-30	6	6	6	6	6	8	6	6	8	6	3	4	6	7	6	90
U-13	6	6	6	6	3	4	6	2	6	5	6	4	6	7	6	79
U-33	6	6	6	6	6	4	6	3	4	2	3	8	6	7	1	74
U-15	6	6	6	6	3	7	5	2	3	6	3	4	6	4	6	73
U-05	6	6	6	6	6	4	6	6	4	2	2	4	6	7	1	72
U-07	6	6	4	6	6	4	2	6	4	2	3	8	6	7	2	72
U-24	6	6	6	6	6	4	6	6	4	2	2	3	6	7	2	72
U-31	6	4	6	6	2	4	1	1	5	2	5	3	6	7	6	64
U-19	6	6	6	6	6	3	2	5	0	6	3	0	6	7	0	62
U-09	6	6	6	6	3	0	6	6	4	0	3	2	6	7	0	61
U-35	6	6	2	6	6	0	6	6	4	0	3	6	2	7	0	60
U-18	6	6	6	1	6	2	2	6	1	6	1	1	6	7	1	58
U-25	6	3	3	2	6	4	3	6	4	2	3	2	6	7	0	57
U-23	5	3	3	2	6	4	3	6	4	2	3	2	6	7	0	56
U-01	6	3	3	2	6	4	3	3	2	2	3	2	6	7	0	52
U-20	6	6	6	2	2	2	3	5	0	2	3	2	6	0	6	51
U-22	6	3	3	2	3	3	3	6	2	2	3	2	6	7	0	51
U-04	6	6	6	2	2	4	3	5	2	2	3	2	2	1	1	47
U-06	6	6	6	3	2	4	0	6	3	1	2	2	6	0	0	47
U-28	6	6	6	2	2	4	0	6	3	2	2	2	6	0	0	47
U-29	6	6	6	2	2	0	3	1	0	2	2	3	6	0	6	45

U-21	6	6	6	2	6	2	3	0	1	2	3	0	6	0	0	43
U-03	6	6	6	2	5	2	3	0	1	2	3	0	6	0	0	42
U-17	6	6	6	2	2	2	3	0	4	2	3	0	6	0	0	42
U-26	6	6	6	2	2	2	3	0	4	2	3	0	6	0	0	42
U-32	6	6	6	2	2	2	3	0	4	2	3	0	6	0	0	42
U-34	6	6	6	2	2	2	3	0	4	2	3	0	6	0	0	42
U-08	6	6	6	2	2	2	3	0	4	2	2	0	6	0	0	41
U-11	6	6	6	2	2	2	3	0	4	2	2	0	6	0	0	41
U-14	6	6	6	2	2	3	3	5	0	2	2	2	2	0	0	41
U-27	6	6	6	6	2	1	0	0	0	2	0	3	6	0	0	38
U-16	6	6	2	2	2	0	2	2	2	2	0	2	6	3	0	37
U-02	6	6	6	6	2	2	0	2	0	2	0	2	2	0	0	36
U-12	6	6	6	6	2	1	0	0	1	2	0	1	2	0	0	33
Jumlah	**209**	**196**	**188**	**130**	**129**	**104**	**110**	**114**	**104**	**88**	**88**	**80**	**190**	**120**	**51**	
rxy hitung	**-0.018**	**-0.029**	**0.021**	**0.597**	**0.622**	**0.726**	**0.693**	**0.545**	**0.665**	**0.546**	**0.508**	**0.652**	**0.2910**	**0.790**	**0.634**	
r tabel	0,334	0,334	0,334	0,334	0,334	0,334	0,334	0,334	0,334	0,334	0,334	0,334	0,334	0,334	0,334	
kriteria	**Invalid**	**Invalid**	**Invalid**	**Valid**	**Valid**	**Valid**	**Valid**	**Valid**	**Valid**	**Valid**	**Valid**	**Valid**	**Invalid**	**Valid**	**Valid**	
K	**15**															
Var Butir	0.028	1.011	1.710	4.092	3.574	3.910	3.773	6.843	4.440	2.610	1.551	4.327	2.016	11.72	5.961	
Var Jum	**57.576**															
Var Tot	**241.33**															
Alpha C	**0.8158**															

Appendix D.2 Sheet of Validation Expert 1

LEMBAR VALIDASI INSTRUMEN TES

KEMAMPUAN PEMAHAMAN MATEMATIKA

Jenis Tes : Essai / Uraian

Nama Penelaah : Yanto Sugianto, S.Pd, M.Pd

Bidang Keahlian : Guru Matematika

PETUNJUK

Sebagai pedoman Bapak/ Ibu untuk mengisi kolom validasi isi perlu dipertimbangkan hal-hal berikut :

1. Apakah soal sudah sesuai dengan indikator?
2. Apakah soal sudah sesuai dengan tujuan pengukuran (pemahaman)?
3. Apakah soal tersebut sudah mempunyai satu kunci jawaban yang tepat?
4. Apakah soal tersebut mempunyai rumusan kalimat dalam bentuk kalimat tanya atau kalimat perintah yang menuntut jawaban uraian?
5. Apakah soal tersebut ada petunjuk yang jelas cara mengerjakan/ menyelesaikan soal dan terdapat pedoman penyekoran?
6. Apakah soal sudah menggunakan bahasa yang sesuai dengan kaidah bahasa Indonesia?

Mohon bapak/ Ibu berkenan memberikan penilaian dengan cara memberikan centang (v) pada kolom yang tersedia sesuai dengan penilaian bapak / ibu.

KISI-KISI SOAL TES PEMAHAMAN

The Comparative Study Between The Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function

(Experimental Study at Science Eleventh Class of *SMAN 5 Kota Cirebon*)

Variabel	Materi Pokok	Indikator Pemahaman	Nomor Soal	Jenis Pemahaman
Pemahaman Matematika	Limit Fungsi	Menghitung limit fungsi aljabar di satu titik bentuk $\lim_{x \to a} f(x)$ dengan menggunakan cara subtitusi	1 , 2	Komputasional
		Menghitung limit fungsi aljabar di satu titik bentuk $\lim_{x \to a} f(x)$ dengan menggunakan cara faktorisasi	3, 4	Komputasional
			5, 6	Fungsional
		Menentukan limit fungsi aljabar di satu titik dan tak hingga bentuk $\lim_{x \to a} f(x)$ dan $\lim_{x \to \infty} f(x)$ dengan perkalian bentuk sekawannya.	7, 8, 9	Fungsional

		Menentukan limit fungsi aljabar di titik tak hingga bentuk $\lim_{x\to\infty} \frac{f(x)}{g(x)}$ dengan membagi pangkat tertinggi	10	Komputasional
		Menentukan limit fungsi aljabar di titik tak hingga bentuk $\lim_{x\to\infty} \sqrt{f(x)} - \sqrt{g(x)}$ dengan perkalian bentuk sekawannya dan membagi pangkat tertinggi	11, 12	Fungsional
		Menghitung limit fungsi Trigonometri di satu titik	13	Komputasional
			14, 15	Fungsional
		Menerapkan sifat-sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri	1-15	Komputasional dan Fungsional

LEMBAR VALIDASI

INSTRUMEN TES PEMAHAMAN MATEMATIKA

No	Soal	Kebahasaan		Materi		Jenis Pemahaman	Keterangan/ Saran
		Langsung Pakai	Perlu Revisi	Langsung Pakai	Perlu Revisi		
1	Hitunglah nilai $\lim_{x \to 3} \left[(x^2 + 3)(2x - 1) \right]$!	✓		✓		Komputasional	
2	Nilai dari $\lim_{x \to -1} \frac{x^5 - x^3 - x}{x^4 - x^3}$ =……	✓		✓		Komputasional	
3	Hitunglah nilai $\lim_{x \to 6} \frac{x^2 - 4x - 12}{x - 6}$!	✓		✓		Komputasional	
4	Tentukan nilai $\lim_{x \to 2} \frac{3x^2 - 8x + 4}{x^2 + 2x - 8}$!	✓		✓		Komputasional	
5	Tentukan nilai $\lim_{x \to 1} \frac{4x^4 - 4x}{x - 1}$!	✓		✓		Fungsional	

6	Hitunglah nilai $\lim_{x\to 2} \frac{2}{x^2-4} - \frac{3}{x^2+2x-8}$!	✓		✓		Fungsional	
7	Nilai dari $\lim_{x\to 4} \frac{x-4}{\sqrt{x^2-16}}$ adalah……	✓		✓		Fungsional	
8	Nilai dari $\lim_{x\to 3} \frac{x^2-9}{\sqrt{x^2+16}-5}$ adalah……..	✓		✓		Fungsional	
9	Tentukan nilai $\lim_{x\to 5} \frac{x^2-3x-10}{5-\sqrt{4x+5}}$!	✓		✓		Fungsional	
10	Hitunglah nilai $\lim_{x\to\infty} \frac{(2x-1)^3}{4x^3-x+1}$!	✓		✓		Komputasional	
11	Nilai dari $\lim_{x\to\infty} \sqrt{4x+8}-\sqrt{4x-3}$ adalah….	✓		✓		Fungsional	
12	Nilai dari $\lim_{x\to\infty} \sqrt{(2x-5)(2x+1)}-(2x-5)$	✓		✓		Fungsional	

13	Hitunglah nilai $\lim_{x\to 0} \frac{\sin 5x}{\tan 3x}$!	✓		✓		Komputasional	
14	Tentukan nilai $\lim_{x\to 0} \frac{1-\cos 2x}{x.\tan(\frac{1}{2}x)}$!	✓		✓		Fungsional	
15	Tentukan nilai $\lim_{x\to 0} \frac{\tan 3x - \tan 3x.\cos 2x}{4x^3}$!	✓		✓		Fungsional	

Cirebon,

Ahli Materi

Yanto Sugianto, S.Pd, M.Pd
NIP. 19620707 1989011001

Appendix D.2 Sheet of Validation Expert 2

LEMBAR VALIDASI INSTRUMEN TES

KEMAMPUAN PEMAHAMAN MATEMATIKA

Jenis Tes : Essai / Uraian

Nama Penelaah : Ika Kartika, S.Pd

Bidang Keahlian : Guru Matematika

PETUNJUK

Sebagai pedoman Bapak/ Ibu untuk mengisi kolom validasi isi perlu dipertimbangkan hal-hal berikut :

1. Apakah soal sudah sesuai dengan indikator?
2. Apakah soal sudah sesuai dengan tujuan pengukuran (pemahaman)?
3. Apakah soal tersebut sudah mempunyai satu kunci jawaban yang tepat?
4. Apakah soal tersebut mempunyai rumusan kalimat dalam bentuk kalimat tanya atau kalimat perintah yang menuntut jawaban uraian?
5. Apakah soal tersebut ada petunjuk yang jelas cara mengerjakan/ menyelesaikan soal dan terdapat pedoman penyekoran?
6. Apakah soal sudah menggunakan bahasa yang sesuai dengan kaidah bahasa Indonesia?

Mohon bapak/ Ibu berkenan memberikan penilaian dengan cara memberikan centang (v) pada kolom yang tersedia sesuai dengan penilaian bapak / ibu.

KISI-KISI SOAL TES PEMAHAMAN

The Comparative Study Between The Students' Understanding of Mathematics by Using Adobe Flash CS3 and iMindMap at the Topic of the Limit of Function

(Experimental Study at Science Eleventh Class of *SMAN 5 Kota Cirebon*)

Variabel	Materi Pokok	Indikator Pemahaman	Nomor Soal	Jenis Pemahaman
Pemahaman Matematika	Limit Fungsi	Menghitung limit fungsi aljabar di satu titik bentuk $\lim_{x \to a} f(x)$ dengan menggunakan cara subtitusi	1 , 2	Komputasional
		Menghitung limit fungsi aljabar di satu titik bentuk $\lim_{x \to a} f(x)$ dengan menggunakan cara faktorisasi	3, 4	Komputasional
			5, 6	Fungsional
		Menentukan limit fungsi aljabar di satu titik dan tak hingga bentuk $\lim_{x \to a} f(x)$ dan $\lim_{x \to \infty} f(x)$ dengan perkalian bentuk sekawannya.	7, 8, 9	Fungsional

		Menentukan limit fungsi aljabar di titik tak hingga bentuk $\lim_{x\to\infty} \frac{f(x)}{g(x)}$ dengan membagi pangkat tertinggi	10	Komputasional
		Menentukan limit fungsi aljabar di titik tak hingga bentuk $\lim_{x\to\infty} \sqrt{f(x)} - \sqrt{g(x)}$ dengan perkalian bentuk sekawannya dan membagi pangkat tertinggi	11, 12	Fungsional
		Menghitung limit fungsi Trigonometri di satu titik	13	Komputasional
			14, 15	Fungsional
		Menerapkan sifat-sifat limit fungsi untuk menghitung bentuk tak tentu fungsi aljabar dan trigonometri	1-15	Komputasional dan Fungsional

LEMBAR VALIDASI

INSTRUMEN TES PEMAHAMAN MATEMATIKA

No	Soal	Kebahasaan		Materi		Jenis Pemahaman	Keterangan/ Saran
		Langsung Pakai	Perlu Revisi	Langsung Pakai	Perlu Revisi		
1	Hitunglah nilai $\lim_{x \to 3} \left[(x^2 + 3)(2x - 1) \right]$!	✓		✓		Komputasional	
2	Nilai dari $\lim_{x \to -1} \frac{x^5 - x^3 - x}{x^4 - x^3}$ =……	✓		✓		Komputasional	
3	Hitunglah nilai $\lim_{x \to 6} \frac{x^2 - 4x - 12}{x - 6}$!	✓		✓		Komputasional	
4	Tentukan nilai $\lim_{x \to 2} \frac{3x^2 - 8x + 4}{x^2 + 2x - 8}$!	✓		✓		Komputasional	
5	Tentukan nilai $\lim_{x \to 1} \frac{4x^4 - 4x}{x - 1}$!	✓		✓		Fungsional	

6	Hitunglah nilai $\lim_{x\to 2} \frac{2}{x^2-4} - \frac{3}{x^2+2x-8}$!	✓		✓		Fungsional	
7	Nilai dari $\lim_{x\to 4} \frac{x-4}{\sqrt{x^2-16}}$ adalah……	✓		✓		Fungsional	
8	Nilai dari $\lim_{x\to 3} \frac{x^2-9}{\sqrt{x^2+16}-5}$ adalah……..	✓		✓		Fungsional	
9	Tentukan nilai $\lim_{x\to 5} \frac{x^2-3x-10}{5-\sqrt{4x+5}}$!	✓		✓		Fungsional	
10	Hitunglah nilai $\lim_{x\to\infty} \frac{(2x-1)^3}{4x^3-x+1}$!	✓		✓		Komputasional	
11	Nilai dari $\lim_{x\to\infty} \sqrt{4x+8}-\sqrt{4x-3}$ adalah….	✓		✓		Fungsional	
12	Nilai dari $\lim_{x\to\infty} \sqrt{(2x-5)(2x+1)}-(2x-5)$	✓		✓		Fungsional	

13	Hitunglah nilai $\lim_{x\to 0} \frac{\sin 5x}{\tan 3x}$!	✓		✓		Komputasional	
14	Tentukan nilai $\lim_{x\to 0} \frac{1-\cos 2x}{x.\tan(\frac{1}{2}x)}$!	✓		✓		Fungsional	
15	Tentukan nilai $\lim_{x\to 0} \frac{\tan 3x - \tan 3x.\cos 2x}{4x^3}$!	✓		✓		Fungsional	

Cirebon,

Ahli Materi

Ika Kartika, S.Pd

NIP. 19630428 198512 2 002

Appendix D.3 Validity Test

Correlations

		TOTAL	Item1	item2	item3	item4	item5	item6	item7	item8	item9	item10	item11	item12	item13	item14	item15
TOTAL	Pearson Correlation	1	-.019	-.029	.022	.597**	.622**	.727**	.693**	.546**	.665**	.546**	.508**	.652**	.291	.790**	.634**
	Sig. (2-tailed)		.914	.867	.902	.000	.000	.000	.000	.001	.000	.001	.002	.000	.090	.000	.000
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Item1	Pearson Correlation	-.019	1	.450**	.315	.147	-.213	-.091	.013	-.182	-.085	.055	-.068	.024	-.070	-.182	.104
	Sig. (2-tailed)	.914		.007	.065	.398	.219	.605	.942	.294	.628	.752	.699	.892	.689	.297	.553
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item2	Pearson Correlation	-.029	.450**	1	.608**	.231	-.238	-.169	.090	-.217	-.061	.130	-.254	.028	-.165	-.427*	.101
	Sig. (2-tailed)	.867	.007		.000	.181	.168	.333	.606	.211	.728	.456	.142	.873	.344	.011	.565
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item3	Pearson Correlation	.022	.315	.608**	1	.152	-.308	.141	-.033	-.304	-.028	.269	.024	-.235	.054	-.411*	.258
	Sig. (2-tailed)	.902	.065	.000		.382	.072	.420	.850	.076	.873	.118	.892	.175	.757	.014	.134
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item4	Pearson Correlation	.597**	.147	.231	.152	1	.268	.292	.310	.181	.302	.217	.072	.614**	-.140	.473**	.355*
	Sig. (2-tailed)	.000	.398	.181	.382		.120	.089	.070	.298	.078	.210	.682	.000	.421	.004	.037
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item5	Pearson Correlation	.622**	-.213	-.238	-.308	.268	1	.383*	.477**	.498**	.256	.295	.196	.397*	.194	.721**	.038
	Sig. (2-tailed)	.000	.219	.168	.072	.120		.023	.004	.002	.138	.085	.260	.018	.264	.000	.827
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35

item6	Pearson Correlation	.727**	-.091	-.169	.141	.292	.383*	1	.323	.394*	.571**	.612**	.376*	.345*	.203	.415*	.514**
	Sig. (2-tailed)	.000	.605	.333	.420	.089	.023		.059	.019	.000	.000	.026	.042	.241	.013	.002
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item7	Pearson Correlation	.693**	.013	.090	-.033	.310	.477**	.323	1	.276	.569**	.201	.479**	.397*	.158	.534**	.364*
	Sig. (2-tailed)	.000	.942	.606	.850	.070	.004	.059		.108	.000	.247	.004	.018	.363	.001	.032
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item8	Pearson Correlation	.546**	-.182	-.217	-.304	.181	.498**	.394*	.276	1	.183	.121	.085	.440**	-.054	.618**	.101
	Sig. (2-tailed)	.001	.294	.211	.076	.298	.002	.019	.108		.293	.489	.629	.008	.757	.000	.565
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item9	Pearson Correlation	.665**	-.085	-.061	-.028	.302	.256	.571**	.569**	.183	1	.220	.510**	.317	.309	.454**	.363*
	Sig. (2-tailed)	.000	.628	.728	.873	.078	.138	.000	.000	.293		.203	.002	.063	.071	.006	.032
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item10	Pearson Correlation	.546**	.055	.130	.269	.217	.295	.612**	.201	.121	.220	1	.157	.043	.234	.315	.535**
	Sig. (2-tailed)	.001	.752	.456	.118	.210	.085	.000	.247	.489	.203		.368	.808	.175	.065	.001
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item11	Pearson Correlation	.508**	-.068	-.254	.024	.072	.196	.376*	.479**	.085	.510**	.157	1	.169	.304	.388*	.423*
	Sig. (2-tailed)	.002	.699	.142	.892	.682	.260	.026	.004	.629	.002	.368		.333	.076	.021	.011
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item12	Pearson Correlation	.652**	.024	.028	-.235	.614**	.397*	.345*	.397*	.440**	.317	.043	.169	1	-.063	.556**	.396*
	Sig. (2-tailed)	.000	.892	.873	.175	.000	.018	.042	.018	.008	.063	.808	.333		.721	.001	.018

	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item13	Pearson Correlation	.291	-.070	-.165	.054	-.140	.194	.203	.158	-.054	.309	.234	.304	-.063	1	.221	.213
	Sig. (2-tailed)	.090	.689	.344	.757	.421	.264	.241	.363	.757	.071	.175	.076	.721		.202	.219
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item14	Pearson Correlation	.790**	-.182	-.427*	-.411*	.473**	.721**	.415*	.534**	.618**	.454**	.315	.388*	.556**	.221	1	.261
	Sig. (2-tailed)	.000	.297	.011	.014	.004	.000	.013	.001	.000	.006	.065	.021	.001	.202		.130
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35
item15	Pearson Correlation	.634**	.104	.101	.258	.355*	.038	.514**	.364*	.101	.363*	.535**	.423*	.396*	.213	.261	1
	Sig. (2-tailed)	.000	.553	.565	.134	.037	.827	.002	.032	.565	.032	.001	.011	.018	.219	.130	
	N	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Based on the table above with the significant level of 0.05 is known that item1 has $\alpha = -0.019$, item2 has $\alpha = -0.029$, item3 has $\alpha = 0.022$ and item 13 has $\alpha = 0.291$. For N = 35 is known r_{table} by 0.334, if $r_{count} > r_{table}$ the items are considered valid question. Thus for item item1, item2, Item3 and item 13 is declared invalid question because $r_{count} < r_{table}$. so for valid items is a matter of no. 4, 5, 6, 7, 8, 9, 10, 11, 12, 14, 15.

Appendix D.4 Reliability Test

Reliability Statistics

Cronbach's Alpha	N of Items
.814	15

Based on the table above that the level of reliability of 15 items essays with Cronbach's alpha coefficient of 0.814. Reliability of the instrument with the value of 0.814 means including into high criteria and reliable to be used in research.

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item1	48.09	235.728	-.022	.819
Item2	48.46	237.255	-.085	.825
item3	48.69	236.163	-.055	.827
item4	50.34	202.467	.505	.798
item5	50.63	208.358	.537	.798
item6	51.09	195.551	.654	.787
item7	50.91	198.139	.617	.790
item8	50.80	198.871	.406	.808
item9	51.09	197.022	.578	.792
item10	51.54	210.785	.474	.801
item11	51.54	217.667	.447	.805
item12	51.77	198.534	.559	.794
item13	48.63	225.123	.200	.816
item14	50.63	164.770	.673	.784
item15	52.60	193.482	.533	.795

Appendix D.5 Difficulty Index

Item No. 1 Diffuculty Index

$$IK = \frac{\bar{x}}{SMI}$$

$$IK = \frac{5.971}{6}$$

$$IK = 0.995$$

Description:

IK : The difficulty index

$\bar{x}$: Mean score of each item

SM : Ideal score (maximum score)

Thus the question number 1 has difficulty index of 0.995 belongs to the easy category. More results are presented in the following table:

R	No. Item Soal															SKOR
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	6	3	3	2	6	4	3	3	2	2	3	2	6	7	0	52
2	6	6	6	6	2	2	0	2	0	2	0	2	2	0	0	36
3	6	6	6	2	5	2	3	0	1	2	3	0	6	0	0	42
4	6	6	6	2	2	4	3	5	2	2	3	2	2	1	1	47
5	6	6	6	6	6	4	6	6	4	2	2	4	6	7	1	72
6	6	6	6	3	2	4	0	6	3	1	2	2	6	0	0	47
7	6	6	4	6	6	4	2	6	4	2	3	8	6	7	2	72
8	6	6	6	2	2	2	3	0	4	2	2	0	6	0	0	41
9	6	6	6	6	3	0	6	6	4	0	3	2	6	7	0	61
10	6	6	6	6	6	8	6	6	8	6	3	4	6	7	7	91
11	6	6	6	2	2	2	3	0	4	2	2	0	6	0	0	41

12	6	6	6	6	2	1	0	0	1	2	0	1	2	0	0	33
13	6	6	6	6	3	4	6	2	6	5	6	4	6	7	6	79
14	6	6	6	2	2	3	3	5	0	2	2	2	2	0	0	41
15	6	6	6	6	3	7	5	2	3	6	3	4	6	4	6	73
16	6	6	2	2	2	0	2	2	2	2	0	2	6	3	0	37
17	6	6	6	2	2	2	3	0	4	2	3	0	6	0	0	42
18	6	6	6	1	6	2	2	6	1	6	1	1	6	7	1	58
19	6	6	6	6	6	3	2	5	0	6	3	0	6	7	0	62
20	6	6	6	2	2	2	3	5	0	2	3	2	6	0	6	51
21	6	6	6	2	6	2	3	0	1	2	3	0	6	0	0	43
22	6	3	3	2	3	3	3	6	2	2	3	2	6	7	0	51
23	5	3	3	2	6	4	3	6	4	2	3	2	6	7	0	56
24	6	6	6	6	6	4	6	6	4	2	2	3	6	7	2	72
25	6	3	3	2	6	4	3	6	4	2	3	2	6	7	0	57
26	6	6	6	2	2	2	3	0	4	2	3	0	6	0	0	42
27	6	6	6	6	2	1	0	0	0	2	0	3	6	0	0	38
28	6	6	6	2	2	4	0	6	3	2	2	2	6	0	0	47
29	6	6	6	2	2	0	3	1	0	2	2	3	6	0	6	45
30	6	6	6	6	6	8	6	6	8	6	3	4	6	7	6	90
31	6	4	6	6	2	4	1	1	5	2	5	3	6	7	6	64
32	6	6	6	2	2	2	3	0	4	2	3	0	6	0	0	42
33	6	6	6	6	6	4	6	3	4	2	3	8	6	7	1	74
34	6	6	6	2	2	2	3	0	4	2	3	0	6	0	0	42
RATA	**5.971**	**5.6**	**5.371**	**3.714**	**3.685**	**2.971**	**3.142**	**3.257**	**2.971**	**2.51**	**2.51**	**2.28**	**5.428**	**3.42**	**1.45**	**5.97**

The Criteria of the Difficulty Index

Nilai IK	Kriteria
IK = 0.00	Terlalu Sukar
0.00 ≤ IK < 0.30	Sukar
0.30 ≤ IK < 0.70	Sedang
0.70 ≤ IK < 1.00	Mudah
IK = 1.00	Terlalu Mudah

The Calculation Result of The Difficulty Index in Class *XI IPA 2*

No	Rata Skor	SMI	IK	Kriteria
1	5.971	6	0.995	Mudah
2	5.6	6	0.933	Mudah
3	5.37	6	0.895	Mudah
4	3.7	6	0.616	Sedang
5	3.69	6	0.615	Sedang
6	2.97	8	0.371	Sedang
7	3.14	6	0.523	Sedang
8	3.26	6	0.543	Sedang
9	2.97	8	0.371	Sedang
10	2.5	6	0.416	Sedang
11	2.51	6	0.418	Sedang
12	2.29	8	0.286	Sukar
13	5.43	6	0.905	Mudah
14	3.43	8	0.428	Sedang
15	1.46	8	0.182	Sukar

Appendix D.6 The Differentiator

Amount members of the upper group and lower group are taken respectively by 27% of the total respondents. So many members of each group is 35 x 27% = 9.18 or the writer takes of 10 respondents (rounded) for each group. After the data results of trial instruments is sorted from largest to smallest score, then it generates students in the on group and students in the under group.

Description:

DP = The differentiator

$\bar{x}_a$ = Mean score of the students group on

$\bar{x}_b$ = Mean score of the students group under

SMI = Score Ideal (Maximum Score)

Item No.1 distinguishing power

$$DP = \frac{\overline{x_a} - \overline{x_b}}{SMI}$$

$$DP = \frac{6-6}{6}$$

$$DP = 0$$

Thus the item number 1 is not having distinguishing power, or about 0 belongs to the ugly category. More results are presented in the following table.

Upper Group

No.	Responden	No. Butir Soal															Jumlah
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
		6	*6*	*6*	*6*	*6*	*8*	*6*	*6*	*8*	*6*	*6*	*8*	*6*	*8*	*8*	
1	**U-10**	6	6	6	6	6	8	6	6	8	6	3	4	6	7	7	91
2	**U-30**	6	6	6	6	6	8	6	6	8	6	3	4	6	7	6	90
3	**U-13**	6	6	6	6	3	4	6	2	6	5	6	4	6	7	6	79
4	**U-33**	6	6	6	6	6	4	6	3	4	2	3	8	6	7	1	74
5	**U-15**	6	6	6	6	3	7	5	2	3	6	3	4	6	4	6	73
6	**U-24**	6	6	6	6	6	4	6	6	4	2	2	3	6	7	2	72
7	**U-07**	6	6	4	6	6	4	2	6	4	2	3	8	6	7	2	72
8	**U-05**	6	6	6	6	6	4	6	6	4	2	2	4	6	7	1	72
9	**U-31**	6	4	6	6	2	4	1	1	5	2	5	3	6	7	6	64
10	**U-19**	6	6	6	6	6	3	2	5	0	6	3	0	6	7	0	62
Jumlah		54	52	52	54	44	47	44	38	46	33	30	42	54	60	37	
Rata-rata		6	5.8	5.8	6	5	5.2	5	4	5	4	3	5	6	7	4	

Lower Group

No.	Responden	No. Butir Soal															Jumlah
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
		6	**6**	**6**	**6**	**6**	**8**	**6**	**6**	**8**	**6**	**6**	**8**	**6**	**8**	**8**	
1	**U-26**	6	6	6	2	2	2	3	0	4	2	3	0	6	0	0	42
2	**U-32**	6	6	6	2	2	2	3	0	4	2	3	0	6	0	0	42
3	**U-34**	6	6	6	2	2	2	3	0	4	2	3	0	6	0	0	42
4	**U-08**	6	6	6	2	2	2	3	0	4	2	2	0	6	0	0	41
5	**U-11**	6	6	6	2	2	2	3	0	4	2	2	0	6	0	0	41
6	**U-14**	6	6	6	2	2	3	3	5	0	2	2	2	2	0	0	41
7	**U-27**	6	6	6	6	2	1	0	0	0	2	0	3	6	0	0	38
8	**U-16**	6	6	2	2	2	0	2	2	2	2	0	2	6	3	0	37
9	**U-02**	6	6	6	6	2	2	0	2	0	2	0	2	2	0	0	36
10	**U-12**	6	6	6	6	2	1	0	0	1	2	0	1	2	0	0	33
Jumlah		60	60	56	32	20	17	20	9	23	20	15	10	48	3	0	
Rata-rata		6	6	5.6	3	2	1.7	2	1	2	2	2	1	5	0	0	

The Criteria of the Differentiator

Nilai DP	Kriteria
DP < 0.00	Sangat Jelek
0.00 ≤ DP < 0.20	Jelek
0.20 ≤ DP < 0.40	Cukup
0.40 ≤ DP < 0.70	Baik
0.70 ≤ DP < 1.00	Baik Sekali

The Calculation Result of the Differentiator in Class *XI IPA 2*

No. Soal	Rata A	Rata B	SMI	DP	Kriteria
1	6	6	6	0	Jelek
2	5.77	6	6	-0.037	Sangat Jelek
3	5.78	5.6	6	0.0003	Jelek
4	6	3.2	6	0.4666	Baik
5	4.9	2	6	0.4833	Baik
6	5.22	1.7	8	0.44	Baik
7	4.89	2	6	0.4816	Baik
8	4.2	0.9	6	0.55	Baik
9	5.11	2.3	8	0.3512	Cukup
10	3.67	2	6	0.2783	Cukup
11	3.33	1.5	6	0.305	Cukup
12	4.67	1	8	0.4587	Baik
13	6	4.8	6	0.2	Cukup
14	6.67	0.3	8	0.7962	Baik Sekali
15	4.11	0	8	0.5137	Baik

Appendix D.7 Recapitulation of Instruments Test Results

Butir Soal	Validitas t tabel = 0.334	Kriteria	Realibilitas	Kriteria	Indeks Kesukaran	Kriteria	Daya Pembeda	Kriteria	Kesimpulan
1	-0.018	Invalid	0.8157	Tinggi	0.995	Mudah	0	Jelek	Ditolak
2	-0.029	Invalid			0.933	Mudah	-0.037	Sangat Jelek	Ditolak
3	0.021	Invalid			0.895	Mudah	0.0003	Jelek	Ditolak
4	0.597	Valid			0.616	Sedang	0.4666	Baik	Diterima
5	0.622	Valid			0.615	Sedang	0.4833	Baik	Diterima
6	0.726	Valid			0.371	Sedang	0.44	Baik	Diterima
7	0.693	Valid			0.523	Sedang	0.4816	Baik	Diterima
8	0.545	Valid			0.543	Sedang	0.55	Baik	Diterima
9	0.665	Valid			0.371	Sedang	0.3512	Cukup	Diterima
10	0.546	Valid			0.416	Sedang	0.2783	Cukup	Diterima
11	0.508	Valid			0.418	Sedang	0.305	Cukup	Diterima
12	0.652	Valid			0.286	Sukar	0.4587	Baik	Diterima
13	0.2910	Invalid			0.905	Mudah	0.2	Cukup	Ditolak
14	0.790	Valid			0.428	Sedang	0.7962	Baik Sekali	Diterima
15	0.634	Valid			0.182	Sukar	0.5137	Baik	Diterima

APPENDIX E

Analysis of The Research Results

E.1 List of Results Test Experiment 1st Class *XI IPA 3*

E.2 List of Results Test Experiment 2nd Class *XI IPA 4*

E.3 Normality Test

E.4 Homogeneity Test

E.5 Hypothesis Testing

Appendix E.1 List of Results Test Experiment 1st Class XI IPA 3

KODE SISWA	No. Butir Soal										SKOR
	1	2	3	4	5	6	7	8	9	10	
S-01	10	10	4	6	10	8	10	4	4	2	68
S-02	10	10	6	10	10	8	10	10	10	7	91
S-03	10	10	6	10	6	8	10	6	8	5	79
S-04	10	8	4	10	1	8	10	6	4	4	65
S-05	10	10	4	10	10	8	10	6	6	6	80
S-06	10	8	4	6	10	8	10	2	6	3	67
S-07	10	10	6	10	10	8	10	1	1	1	67
S-08	10	10	4	10	10	8	10	3	1	1	67
S-09	10	10	4	10	10	8	6	4	4	6	72
S-10	10	4	4	6	6	8	10	5	2	2	57
S-11	10	8	4	10	2	8	10	6	6	2	66
S-12	10	2	4	6	6	8	10	2	2	2	52
S-13	10	2	4	6	6	8	10	2	2	2	52
S-14	10	8	6	10	10	8	10	4	6	5	77
S-15	10	10	4	10	10	8	6	6	6	6	76
S-16	10	8	4	10	1	8	10	6	4	4	65
S-17	10	8	4	10	7	8	10	6	1	1	65
S-18	10	8	4	6	10	8	10	4	6	4	70
S-19	10	10	4	10	10	8	7	4	6	1	70
S-20	10	8	4	6	10	8	10	0	2	0	58
S-21	10	2	6	6	6	8	10	2	2	2	54
S-22	10	8	6	6	10	8	8	4	2	1	63
S-23	10	10	6	10	10	8	10	8	10	6	88
S-24	10	10	6	10	10	8	8	6	8	3	79
S-25	10	4	4	4	6	8	10	3	3	4	56
S-26	10	8	4	6	10	8	6	4	6	0	62
S-27	10	4	4	4	6	8	10	6	2	3	57
S-28	4	8	4	10	10	8	10	0	6	6	66
S-29	10	4	6	10	10	8	6	6	10	8	78
S-30	10	8	4	6	10	8	6	4	2	1	59
S-31	10	8	4	4	10	8	6	1	4	4	59
S-32	10	8	6	6	10	8	6	2	2	2	60
S-33	10	2	4	6	6	8	10	2	2	2	52
S-34	10	10	8	10	10	8	10	10	6	6	88
Nilai Rata-rata											**67.205**
Nilai Tertingi											**91**
Nilai Terendah											**52**

Appendix E.2 List of Results Test Experiment 2nd Class *XI IPA 4*

KODE SISWA	No. Butir Soal										SKOR
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	
S-01	6	4	10	6	4	8	6	10	10	0	64
S-02	10	10	6	2	10	6	10	6	6	8	74
S-03	2	8	4	4	4	8	2	4	4	2	42
S-04	10	10	8	10	10	10	10	6	4	4	82
S-05	10	10	6	4	10	8	10	6	10	0	74
S-06	10	4	4	10	10	8	9	0	4	2	61
S-07	10	4	4	10	4	8	4	4	4	2	54
S-08	6	4	10	6	10	0	10	2	10	0	58
S-09	6	2	0	6	4	6	8	4	1	4	41
S-10	2	2	4	10	10	8	9	4	6	6	61
S-11	2	2	4	10	10	6	9	4	4	2	53
S-12	10	4	10	6	6	6	9	4	6	6	67
S-13	10	4	4	4	10	8	9	0	4	2	55
S-14	10	10	10	10	0	10	0	6	2	0	58
S-15	10	8	4	10	8	8	2	4	2	2	58
S-16	10	8	1	6	10	8	6	4	0	0	53
S-17	10	4	4	4	4	8	8	4	4	2	52
S-18	10	10	6	10	10	8	9	2	0	2	67
S-19	10	10	8	10	10	8	9	4	0	2	71
S-20	10	10	8	10	10	10	9	6	1	2	76
S-21	2	8	4	8	4	8	2	4	2	2	44
S-22	6	1	1	10	8	10	8	1	1	2	48
S-23	10	10	8	6	10	10	10	6	4	4	78
S-24	10	10	10	10	0	10	0	6	2	0	58
S-25	10	4	4	10	10	8	9	0	4	2	61
S-26	10	10	8	10	10	10	9	6	2	2	77
S-27	10	8	6	10	10	8	10	6	6	6	80
S-28	10	10	6	10	10	8	6	0	0	2	62
S-29	10	4	4	6	6	8	6	4	4	2	54
S-30	10	4	4	2	10	8	6	0	4	6	54
S-31	10	4	4	4	10	8	9	0	4	2	55
Rata-rata											**61.032**
Nilai Tertinggi											**82**
Nilai Terendah											**41**

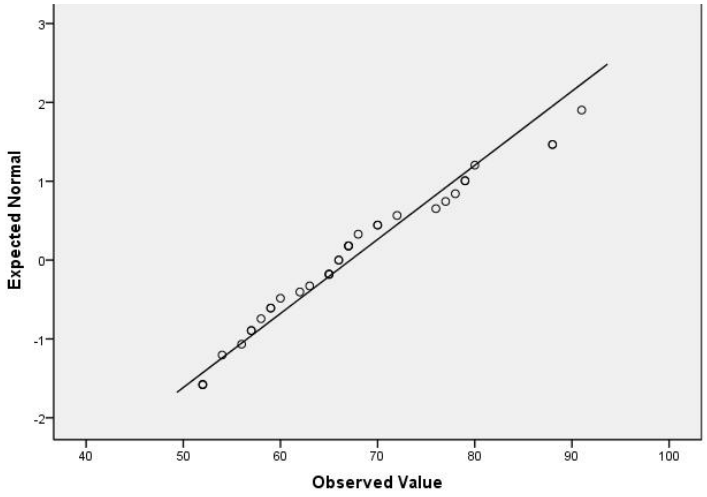
Appendix E.3 Normality Test of Understanding Mathematics

Tests of Normality

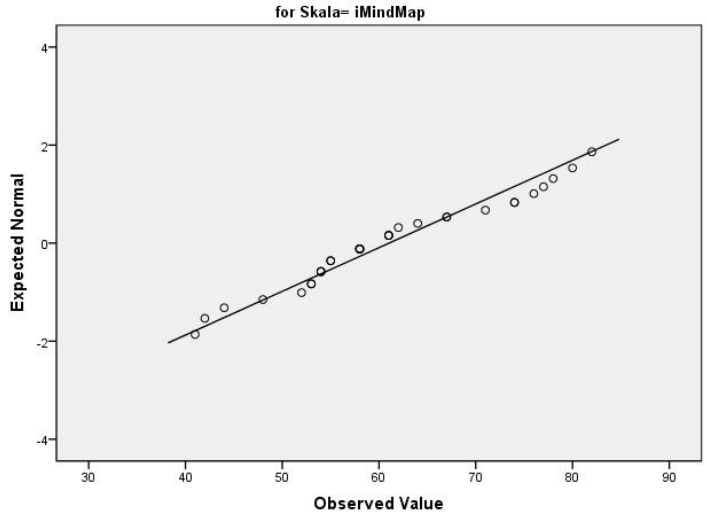
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Skala	Statistic	df	Sig.	Statistic	df	Sig.
Pemahaman Matematika	Adobe Flash CS3	.125	34	.194	.948	34	.109
	iMindMap	.123	31	.200*	.958	31	.253

a. Lilliefors Significance Correction

*. This is a lower bound of the true significance.



Normal Q-Q Plot of Pemahaman Matematika
for Skala= iMindMap



In addition to using the Kolmogorov-Smirnov test, by using the chart above is known that the points approach around the straight-line, thus both test results are included in the normal distribution.

Appendix E.4 Homogeneity Test of Understanding Mathematics

Test of Homogeneity of Variances

Pemahaman Matematika

Levene Statistic	df1	df2	Sig.
.158	1	63	.693

ANOVA

Pemahaman Matematika

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	618.027	1	618.027	5.183	.026
Within Groups	7512.527	63	119.246		
Total	8130.554	64			

Appendix E.5 Hypothesis Testing

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Pemahaman Matematika	Equal variances assumed	.158	.693	2.277	63	.026	6.174	2.712	.755	11.593
	Equal variances not assumed			2.271	61.680	.027	6.174	2.719	.739	11.608

APPENDIX F

Distribution Table

F.1. T Distribution Table
F.2. R Product Moment Table
F.3. Normal Curve Table

Appendix F.1. T Distribution Table

TABEL II
NILAI-NILAI DALAM DISTRIBUSI t

α untuk uji dua fihak (two tail test)						
	0,50	0,20	0,10	0,05	0,02	0,01
α untuk uji satu fihak (one tail test)						
dk	0,25	0,10	0,05	0,025	0,01	0,005
1	1,000	3,078	6,314	12,706	31,821	63,657
2	0,816	1,886	2,920	4,303	6,965	9,925
3	0,765	1,638	2,353	3,182	4,541	5,841
4	0,741	1,533	2,132	2,776	3,747	4,604
5	0,727	1,476	2,015	2,571	3,365	4,032
6	0,718	1,440	1,943	2,447	3,143	3,707
7	0,711	1,415	1,895	2,365	2,998	3,499
8	0,706	1,397	1,860	2,306	2,896	3,355
9	0,703	1,383	1,833	2,262	2,821	3,250
10	0,700	1,372	1,812	2,228	2,764	3,169
11	0,697	1,363	1,796	2,201	2,718	3,106
12	0,695	1,356	1,782	2,179	2,681	3,055
13	0,692	1,350	1,771	2,160	2,650	3,012
14	0,691	1,345	1,761	2,145	2,624	2,977
15	0,690	1,341	1,753	2,131	2,602	2,947
16	0,689	1,337	1,746	2,120	2,583	2,921
17	0,688	1,333	1,740	2,110	2,567	2,898
18	0,688	1,330	1,734	2,101	2,552	2,878
19	0,687	1,328	1,729	2,093	2,539	2,861
20	0,687	1,325	1,725	2,086	2,528	2,845
21	0,686	1,323	1,721	2,080	2,518	2,831
22	0,686	1,321	1,717	2,074	2,508	2,819
23	0,685	1,319	1,714	2,069	2,500	2,807
24	0,685	1,318	1,711	2,064	2,492	2,797
25	0,684	1,316	1,708	2,060	2,485	2,787
26	0,684	1,315	1,706	2,056	2,479	2,779
27	0,684	1,314	1,703	2,052	2,473	2,771
28	0,683	1,313	1,701	2,048	2,467	2,763
29	0,683	1,311	1,699	2,045	2,462	2,756
30	0,683	1,310	1,697	2,042	2,457	2,750
40	0,681	1,303	1,684	2,021	2,423	2,704
60	0,679	1,296	1,671	2,000	2,390	2,660
120	0,677	1,289	1,658	1,980	2,358	2,617
∞	0,674	1,282	1,645	1,960	2,326	2,576

Appendix F.2. R Product Moment Table

TABEL III
NILAI-NILAI r PODUCT MOMENT

N	Taraf Signifikan		N	Taraf Signifikan		N	Taraf Signifikan	
	5%	1%		5%	1%		5%	1%
3	0,997	0,999	27	0,381	0,487	55	0,266	0,345
4	0,950	0,990	28	0,374	0,478	60	0,254	0,330
5	0,878	0,959	29	0,367	0,470	65	0,244	0,317
6	0,811	0,917	30	0,361	0,463	70	0,235	0,306
7	0,754	0,874	31	0,355	0,456	75	0,227	0,296
8	0,707	0,834	32	0,349	0,449	80	0,220	0,286
9	0,666	0,798	33	0,344	0,442	85	0,213	0,278
10	0,632	0,765	34	0,339	0,436	90	0,207	0,270
11	0,602	0,735	35	0,334	0,430	95	0,202	0,263
12	0,576	0,708	36	0,329	0,424	100	0,195	0,256
13	0,553	0,684	37	0,325	0,418	125	0,176	0,230
14	0,532	0,661	38	0,320	0,413	150	0,159	0,210
15	0,514	0,641	39	0,316	0,408	175	0,148	0,194
16	0,497	0,623	40	0,312	0,403	200	0,138	0,181
17	0,482	0,606	41	0,308	0,398	300	0,113	0,148
18	0,468	0,590	42	0,304	0,393	400	0,098	0,128
19	0,456	0,575	43	0,301	0,389	500	0,088	0,115
20	0,444	0,561	44	0,297	0,384	600	0,080	0,105
21	0,433	0,549	45	0,294	0,380	700	0,074	0,097
22	0,423	0,537	46	0,291	0,376	800	0,070	0,091
23	0,413	0,526	47	0,288	0,372	900	0,065	0,086
24	0,404	0,515	48	0,284	0,368	1000	0,062	0,081
25	0,396	0,505	49	0,281	0,364			
26	0,388	0,496	50	0,279	0,361			

Appendix F.3. Normal Curve Table

TABEL I
LUAS DI BAWAH LENGKUNGAN KURVE NORMAL
DARI 0 S/D Z

z	0	1	2	3	4	5	6	7	8	9
0,0	00,00	00,40	00,80	01,20	01,60	01,99	02,39	02,79	03,19	03,59
0,1	03,98	04,38	04,78	05,17	05,57	05,96	06,36	06,75	07,14	07,53
0,2	07,93	08,32	08,71	09,10	09,48	09,87	10,26	10,64	11,03	11,41
0,3	11,79	12,17	12,55	12,93	13,31	13,68	14,06	14,43	14,80	15,17
0,4	15,54	15,91	16,28	16,64	17,00	17,36	17,72	18,08	18,44	18,79
0,5	19,15	19,50	19,85	20,19	20,54	20,88	21,23	21,57	21,90	22,24
0,6	22,57	22,91	23,24	23,57	23,89	24,22	24,54	24,86	25,17	25,49
0,7	25,80	26,11	26,42	26,73	27,03	27,34	27,64	27,94	28,23	28,52
0,8	28,81	29,10	29,39	29,67	29,95	30,23	30,51	30,78	31,06	31,33
0,9	31,59	31,86	32,12	32,38	32,64	32,89	33,15	33,40	33,65	33,89
1,0	34,13	34,38	34,61	34,85	35,08	35,31	35,54	35,77	35,99	36,21
1,1	36,43	36,65	36,86	37,08	37,29	37,49	37,70	37,90	38,10	38,30
1,2	38,49	38,69	38,88	39,07	39,25	39,44	39,62	39,80	39,97	40,15
1,3	40,32	40,49	40,66	40,82	40,99	41,15	41,31	41,47	41,62	41,77
1,4	41,92	42,07	42,22	42,36	42,51	42,65	42,79	42,92	43,06	43,19
1,5	43,32	43,45	43,57	43,70	43,82	43,94	44,06	44,19	44,29	44,41
1,6	44,52	44,63	44,74	44,84	44,95	45,05	45,15	45,25	45,35	45,45
1,7	45,54	45,64	45,73	45,82	45,91	45,99	46,08	46,16	46,25	46,33
1,8	46,41	46,49	46,56	46,64	46,71	46,78	46,86	46,93	46,99	47,06
1,9	47,13	47,19	47,26	47,32	47,38	47,44	47,50	47,56	47,61	47,67
2,0	47,72	47,78	47,83	47,88	47,93	47,98	48,03	48,08	48,12	48,17
2,1	48,21	48,26	48,30	48,34	48,38	48,42	48,46	48,50	48,54	48,57
2,2	48,61	48,64	48,68	48,71	48,75	48,78	48,81	48,84	48,87	48,90
2,3	48,98	48,96	48,98	49,01	40,04	49,06	49,09	49,11	49,13	49,16
2,4	49,18	49,20	49,22	40,25	49,27	49,29	49,31	49,32	49,34	49,36
2,5	49,38	49,40	49,41	40,43	49,45	49,46	49,48	49,49	49,51	49,52
2,6	49,53	49,55	49,56	49,57	49,59	49,60	49,61	49,62	49,63	49,64
2,7	49,65	49,66	49,67	49,68	49,69	49,70	49,71	49,72	49,73	49,74
2,8	40,74	49,75	49,76	49,77	49,77	49,78	49,79	49,79	49,80	49,81
2,9	49,81	49,82	49,82	40,83	49,84	49,84	49,85	49,85	49,86	49,86
3,0	49,87	49,87	49,87	49,88	49,88	49,89	49,89	49,89	49,90	49,90
3,1	49,90	49,91	49,91	49,91	49,92	49,92	49,92	49,92	49,93	49,93
3,2	49,93	49,93	49,94	49,94	49,94	49,94	49,94	49,95	49,95	49,95
3,3	49,95	49,95	49,95	49,96	49,96	49,96	49,96	49,96	49,97	49,97
3,4	49,97	49,97	49,97	49,97	49,97	49,97	49,97	49,97	49,97	49,98
3,5	49,98	49,98	49,98	49,98	49,98	49,98	49,98	49,98	49,98	49,98
3,6	49,98	49,98	49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
3,7	49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
3,8	49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99	49,99
3,9	50,00	50,00	50,00	50,00	50,00	50,00	50,00	50,00	50,00	50,00

APPENDIX G

Letters

G.1 The Approval Letter of Research

G.2 The Letter of finishing the research

G.3 The Decision letter of Supervisors

G.4 The Letter of Introductory Research

G.5 The Guidance Card

PEMERINTAH KOTA CIREBON
DINAS PENDIDIKAN
SEKOLAH MENENGAH ATAS NEGERI 5
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e-mail : info@sman5cirebon.sch.id – website : http://www.sman5cirebon.sch.id

Surat Persetujuan Tempat Penelitian

Nomor : 421.7/116/SMA5/2013

Yang bertanda tangan di bawah ini, Kepala Sekolah Menengah Atas Negeri 5 Kota Cirebon menerangkan bahwa :

N a m a	: **SUDIANTO**
N I M	: 59451098
Jurusan	: Matematika
Fakultas	: Tarbiyah IAIN Syekh Nurjati Cirebon
Waktu Penelitian	: Senin, 11 Maret 2013 s.d 11 Mei 2013

Adalah benar mahasiswa IAIN Cirebon dan diijinkan untuk melakukan penelitian di SMA Negeri 5 Kota Cirebon dalam rangka penyusunan skripsi yang berjudul :

"THE COMPARATIVE STUDY BETWEEN THE STUDENTS' UNDERSTANDING OF MATHEMATICS USING ADOBE FLASH CS3 AND SOFTWARE IMINDMAP AT THE TOPIC OF THE LIMIT OF FUNCTION **(Experimental Study at Science Eleventh of SMAN 5 Kota Cirebon)."**

Demikian surat persetujuan ini kami buat untuk dapat dipergunakan sebagaimana mestinya.

Cirebon, 6 Maret 2013
Kepala SMA Negeri 5 Kota Cirebon

PEMERINTAH KOTA CIREBON ★ SMA NEGERI 5 ★ DINAS PENDIDIKAN

Drs. Mulya Hadiwijaya, M.Pd.
Pembina Utama Muda
NIP. 19560702 197512 1 001

PEMERINTAH KOTA CIREBON
DINAS PENDIDIKAN
SEKOLAH MENENGAH ATAS NEGERI 5
Jl. Perjuangan Majasem Telp. (0231) 480537 – Fax. (0231) 8301546 Cirebon 45135
e-mail : info@sman5cirebon.sch.id – website : http://www.sman5cirebon.sch.id

SURAT KETERANGAN

Nomor : 423.4/442/SMA5/2013

Yang bertanda tangan di bawah ini :

N a m a	: **Drs. Mulya Hadiwijaya, M.Pd**
N I P	: 19560702 197512 1 001
Pangkat/Gol. Ruang	: Pembina Utama Muda, IV/c
Jabatan	: Kepala Sekolah
Unit Kerja	: SMA Negeri 5 Cirebon

Menerangkan dengan sebenarnya :

N a m a	: SUDIANTO
N I M	: 59451098
Jurusan	: Matematika
Fakultas	: Tarbiyah IAIN Syekh Nurjati Cirebon
Waktu Penelitian	: Senin, 11 Maret 2013 s.d 11 Mei 2013

Benar telah melakukan Penelitian di SMA Negeri 5 Kota Cirebon dengan judul:
"**THE COMPARATIVE STUDY BETWEEN THE STUDENTS' UNDERSTANDING OF MATHEMATICS USING ADOBE FLASH CS3 AND SOFTWARE IMINDMAP AT THE TOPIC OF THE LIMIT OF FUNCTION (Experimental Study at Science Eleventh of SMAN 5 Kota Cirebon).**"

Demikian surat keterangan ini kami buat untuk dapat dipergunakan sebagaimana mestinya.

Cirebon, 29 Mei 2013
Kepala SMA Negeri 5 Kota Cirebon

PEMERINTAH KOTA CIREBON
SMA NEGERI 5
DINAS PENDIDIKAN

Drs. Mulya Hadiwijaya, M.Pd
Pembina Utama Muda
NIP. 19560702 197512 1 001

KEPUTUSAN
DEKAN FAKULTAS TARBIYAH
INSTITUT AGAMA ISLAM NEGERI (IAIN) SYEKH NURJATI CIREBON
Nomor : In.14/F.I.1/PP.009/1264/2013

TENTANG
PEMBIMBING PENYUSUNAN SKRIPSI MAHASISWA
FAKULTAS TARBIYAH IAIN SYEKH NURJATI CIREBON

DEKAN FAKULTAS TARBIYAH

Menimbang :
a. bahwa dalam rangka menunjang kelancaran pelaksanaan penyusunan skripsi mahasiswa Program Sarjana Fakultas Tarbiyah IAIN Syekh Nurjati Cirebon perlu ditunjuk pembimbing skripsi;
b. bahwa Saudara yang namanya tercantum dalam Keputusan ini dipandang mampu dan memenuhi syarat untuk menjadi pembimbing skripsi mahasiswa Fakultas Tarbiyah IAIN Syekh Nurjati Cirebon.

Mengingat :
1. Undang-Undang Nomor 20 Tahun 2003 tentang Sistem Pendidikan Nasional
2. Undang-undang Nomor 14 Tahun 2005 tentang Guru dan Dosen;
3. Peraturan Pemerintah RI Nomor 60 Tahun 1999 jo Nomor 17 Tahun 2010 tentang Pengelolaan dan Penyelenggaraan Pendidikan jo Nomor 66 Tahun 2010 tentang Perubahan Peraturan Pemerintah Nomor 17 Tahun 2010;
4. Peraturan Pemerintah Republik Indonesia Nomor 19 Tahun 2005 tentang Standar Nasional Pendidikan;
5. Peraturan Pemerintah Republik Indonesia Nomor 37 Tahun 2009 tentang Dosen;
6. Peraturan Menteri Agama Republik Indonesia Nomor 11 Tahun 2013 tentang Organisasi dan Tata Kerja IAIN Syekh Nurjati Cirebon;
7. Peraturan Menteri Agama RI Nomor 66 Tahun 2010 tentang Statuta IAIN Syekh Nurjati Cirebon;
8. Kurikulum Institut Agama Islam Negeri Syekh Nurjati Cirebon Tahun 2012;
9. Pedoman Akademik Institut Agama Islam Negeri Syekh Nurjati Cirebon Tahun 2012.

Menetapkan : **MEMUTUSKAN**

Pertama : Terhitung mulai tanggal 14 Maret 2013 Mengangkat:
1. **Mustopa,M.Ag**
2. **Arif Muchyidin,M.Si**

Sebagai pembimbing penyusunan skripsi mahasiswa tersebut dibawah ini:

Nama	:	**SUDIANTO**
NIM	:	**59451098**
Jurusan	:	**Tadris Matematika**
Judul Skripsi	:	**THE COMPARATIVE STUDY BETWEEN THE STUDENTS UNDERSTANDING OF MATHEMATICS USING ADOBE FLASH CS3 AND SOFTWARE IMINDMAP AT THE TOPIC OF THE LIMIT OF FUNCTION (Experimental Study at science Eleventh Class of SMAN 5 Kota Cirebon)**

Kedua : Kepada pembimbing diberikan honorarium sesuai dengan ketentuan yang berlaku.

Ketiga : Keputusan ini berlaku untuk **Semester Genap** terhitung mulai tanggal **01 Februari s.d. 31 Agustus 2013**, dengan ketentuan apabila terdapat kekeliruan dalam penetapan ini akan diadakan perubahan dan perbaikan sebagaimana mestinya.

KUTIPAN Keputusan ini diberikan kepada yang bersangkutan untuk diketahui dan dilaksanakan sebagaimana mestinya.

Ditetapkan di : Cirebon
Tanggal : 14 Maret 2013

Pembantu Dekan Bidang Akademik,

Dikdik Baehaqi Arif, M.Ag.
NIP. 19670504 199403 1 003

Tembusan :
1. Ketua Jurusan Tadris Matematika Fakultas Tarbiyah IAIN Syekh Nurjati Cirebon;
2. Dosen Pembimbing untuk diketahui dan dilaksanakan.
3. Kabag TU Fakultas Tarbiyah,
4. Kasubag Akademik Fakultas Tarbiyah.

KEMENTERIAN AGAMA
INSTITUT AGAMA ISLAM NEGERI (IAIN)
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Website: http:/www.iainsyekhnurjaticrb.ac.id E-mail: dafo@ iainsyekhnurjaticrb.ac.id

SURAT PENGANTAR PENELITIAN

Nomor : In.14/F.I.1/PP.00.9/1265/2013

Dekan Fakultas Tarbiyah Institut Agama Islam Negeri (IAIN) Syekh Nurjati Cirebon, menerangkan bahwa yang namanya tersebut di bawah ini :

Nama	: **SUDIANTO**
Tempat/Tgl. Lahir	: Cirebon, 23 Mei 1990
NIM	: 59451098
Smt/Fak-Jurusan	: VIII/ Tarbiyah Tadris Matematika
Alamat	: Desa Suranenggala Kidul Rt 001 Rw 001 Kec. Suranenggala Kab. Cirebon

Akan melaksanakan penelitian dalam rangka penyusunan ***skripsi*** yang berjudul :

THE COMPARATIVE STUDY BETWEEN THE STUDENTS UNDERSTANDING OF MATHEMATICS USING ADOBE FLASH CS3 AND SOFTWARE IMINDMAP AT THE TOPIC OF THE LIMIT OF FUNCTION (Experimental Study at science Eleventh Class of SMAN 5 Kota Cirebon)

Penelitian ini dilaksanakan selama 2 (dua) bulan mulai tanggal 11 Maret s.d 11 Mei 2013.

Teknik pengumpulan data :

1. Observasi
2. Tes

Demikian disampaikan, dan kepada yang berkepentingan harap menjadi maklum Atas perhatian dan bantuan Saudara, kami ucapkan terima kasih.

Cirebon, 14 Maret 2013

a.n Dekan
Pembantu Dekan Bidang akademik,

Djohar Maknun, S.Si. M.Si
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KEMENTERIAN AGAMA RI
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KARTU BIMBINGAN SKRIPSI

SEMESTER GASAL/GENAP TAHUN AKADEMIK ...../.....

Nama : SUDIANTO	Pembimbing I : MUSTOPA, M.Ag
NIM : 5945098	Pembimbing II : ARIF MUCHYIDIN, M.Si
Fakultas/Jurusan : TARBIYAH / MATEMATIKA	
Judul Skripsi : THE COMPARATIVE STUDY BETWEEN THE STUDENTS' UNDERSTANDING OF MATHEMATICS USING ADOBE FLASH CS3 AND SOFT WARE IMINDMAP AT THE TOPIC OF THE LIMIT OF FUNCTION (Experimental study at SCIENCE Eleventh Class of SMANTS kota cirebon)	

Pembimbing I

Pertemuan	Tgl/Bln/Th	Materi Bimbingan	Paraf
I	14-05-2013	Translation title of the research	
II	28-05-2013	Methobology of the Research	
III	4/6 13	check chapter I - III	
IV	8/6 13	Revise chapter II & III	
V	11/6 13	check chapter IV & V	
VI	19/6 13	Revise chapter IV	
VII	26/06 13	Revise chapter V	
VIII	3/07 13	Abstract	
IX	28/07 13	Acc	
X			
XI			
XII			

Pembimbing II

Pertemuan	Tgl/Bln/Th	Materi Bimbingan	Paraf
I	18-3-2013	Evaluasi Media pembelajaran Adobe Flash	
II	4-4-2013	Revisi BAB I Pendahuluan	
III	10-4-2013	Instrumen penelitian Test (IPD)	
IV	23-04-2013	Analisis uji coba instrumen	
V	21-05-2013	Analisis thipotesis Post test	
VI	28-05-2013	Revisi BAB IV dan V	
VII	29-05-2013	Revisi BAB III	
VIII	26-06-2013	Revisi BAB II	
IX	24/07 13	ACC skripsi	
X			
XI			
XII			

Pembimbing I,

MUSTOPA, M.Ag

Pembimbing II,

ARIF MUCHYIDIN, M.Si

Mengetahui
Ketua Jurusan .....

Catatan : Setiap pelaksanaan konsultasi dalam rangka penyusunan skripsi, kartu ini harap diisi dan ditandatangani oleh pembimbing